96-139

BARRIER ISLAND PROTECTION SYSTEM

HEARING

BEFORE THE

SUBCOMMITTEE ON PARKS, RECREATION,
AND RENEWABLE RESOURCES

OF THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

NINETY-SIXTH CONGRESS

SECOND SESSION

ON

S. 2686

A BILL TO DIRECT THE SECRETARY OF THE INTERIOR TO
PROVIDE FOR THE PROTECTION OF THE BARRIER ISLANDS,
AND FOR OTHER PURPOSES

JUNE 12, 1980

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BARRIER ISLAND PROTECTION SYSTEM

THURSDAY, JUNE 12, 1980

U.S. SENATE,
SUBCOMMITTEE ON PARKS,
RECREATION, AND RENEWABLE RESOURCES,
OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:05 a.m., in room 3110, Dirksen Office Building, Hon. Dale Bumpers, presiding.

Present: Senators Bumpers, Johnston, and Tsongas.

Also present: Robert Kutler, counsel.

OPENING STATEMENT OF HON. DALE BUMPERS, A U.S. SENATOR FROM THE STATE OF ARKANSAS

Senator **BUMPERS**. The purpose of this morning's hearing is to receive testimony on S. 2686, a bill to provide for the protection of the barrier islands.

I introduced S. 2686 on May 9, with three other members of this committee as cosponsors—Senators Jackson, Tsongas, and Weicker. I appreciate having the chairman of this committee as a cosponsor as well as bipartisan support from two Senators whose States are included in the provisions of the bill.

I have had a few people ask why I introduced a bill of this nature since my home State at last count doesn't have any barrier islands. The reasons for that are first, I am thoroughly convinced it is folly for the Federal Government to encourage the development, and if a natural disaster occurs, the redevelopment of barrier islands for residential and commercial use.

Over $500 million in Federal funds has been spent over the last 3 years for this purpose. It was spent on correcting problems which never would have occurred if the Federal Government had not encouraged development of the islands in the first place.

Second, because access to these barrier islands is often only by ferry or two-lane roads, there is a serious potential threat to the lives of barrier island residents who may be faced with the evacuation of their homes on short notice because of an impending hurricane or major storm.

Third, most of these barrier islands consist mainly of sand, which migrates according to nature's wind and wave patterns and is best left untouched by human development or intervention.

It has only been during the last few years that the public and agencies of the Government have taken notice of these problems. The President called for a study of the hazards associated with barrier island development and recommendations for changes in Federal policy in his environmental message of 1977.

Three years have now passed, and still no recommendation has been made to the President, nor is it clear when it will be. The suggestion that Congress should wait 2 more years before taking any action, therefore, would simply be to make that many more mistakes perpetrated with Federal assistance and there would be that many more people's lives threatened and that many fewer areas where nature would be allowed to work its course.

Instead, I am convinced that 1980 ought to be the year when Congress takes action on this important legislation. There are some clarifications to be made in the language of the bill. There is still more work that is necessary to assure that the maps are completely accurate, but there is sufficient time to accomplish this remaining work and to pass S. 2686 this session.

I feel confident that when my colleagues have an opportunity to learn about the fiscal savings and public benefits to be realized by the passage of this bill, the legislation can move expeditiously.

While this subcommittee is in need of the views of the witnesses, we have a long witness list and we are operating under very severe time constraints. I, therefore, would ask everyone who is testifying to please make your statements concise and no longer than 5 minutes.

The written testimony will be included in full in the official transcript of this hearing and made available to all members of the committee.

I will insert in the record at this point the text of the bill.

[The bill follows:]

II

96TH CONGRESS
2D SESSION

S. 2686

To direct the Secretary of the Interior to provide for the protection of the Barrier Islands, and for other purposes.

IN THE SENATE OF THE UNITED STATES

MAY 9 (legislative day, JANUARY 3), 1980

Mr. BUMPERS (for himself, Mr. JACKSON, Mr. TSONGAS, and Mr. WEICKER) introduced the following bill; which was read twice and referred jointly by unanimous consent to the Committee on Energy and Natural Resources and the Committee on Environment and Public Works, provided, if ordered reported by one committee, the other be granted thirty days to report, or be discharged

---

A BILL

To direct the Secretary of the Interior to provide for the protection of the Barrier Islands, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

FINDINGS AND STATEMENTS OF POLICY

SEC. 1. The Congress finds and declares that—

(1) there are resources of extraordinary scenic, scientific, recreational, natural, historic, archeological,

and cultural value present on the barrier islands which are being irretrievably damaged and lost;

(2) the barrier islands are generally unsuitable for development because of erosion and sand migratory patterns that undermine permanent manmade structures;

(3) certain development on barrier islands severely restricts the natural processes on which the islands are dependent; and

(4) critical to more effective use and conservation of the unique values of barrier islands is a program of coordinated action by Federal, State, and local governments to protect the islands for natural, scenic, ecological, scientific, cultural, historic, conservation, and recreation opportunities.

BARRIER ISLANDS ADVISORY COUNCIL

SEC. 2. (a) ESTABLISHMENT.—There is hereby established the Barrier Islands Advisory Council (hereinafter in this Act referred to as the "Council").

(b) CHAIRMAN.—The Secretary of the Interior (hereinafter referred to as the "Secretary") shall serve as Chairman of the Council.

(c) MEMBERS.—In addition to the Chairman, the Council shall consist of representatives of the following departments or agencies: the Department of Transportation; Housing and Urban Development; Commerce; Energy; Agriculture; Defense; Small Business Administration; Federal Emergency Management Agency; Environmental Protection Agency; General Services Administration; Council on Environmental Quality; National Park Service; Heritage Conservation and Recreation Service; Fish and Wildlife Service; and the Advisory Council on Historic Preservation.

(d) MEETINGS.—The Council shall meet at the call of the Chairman, but not less than six times each year. All Council meetings shall be open to the public, and at least fifteen days prior to the date when any meeting of the Council is to take place the Chairman shall publish public notice of such meeting in the Federal Register.

(e) FUNCTIONS.—It shall be the function of the Council to—

(1) conduct studies and advise the Chairman with respect to ongoing, planned, and proposed Federal actions affecting the barrier islands, barrier spits, and bay barriers located along the Atlantic and gulf coasts (hereinafter referred to as the "barrier islands") including preservation of natural, cultural, and historic resources, transportation planning, acquisition priorities, economic development, beach restoration and preservation, flood insurance, disaster relief, and such other

matters as may be submitted for advise by the members.

(2) make recommendations with respect to proposed regulations or management plans promulgated by any Federal agency which may adversely affect barrier islands; and

(3) make recommendations with respect to ways to improve coordination and consultation between Federal agencies and between such agencies and the several States before actions are taken which may adversely affect the barrier islands.

CONSERVATION OF BARRIER ISLAND RESOURCES

SEC. 3. (a) The provisions of this section shall apply to those undeveloped barrier islands and undeveloped portions of barrier islands identified and generally depicted on maps appropriately referenced and dated, which taken together comprise the "Barrier Islands Protection System". Such maps shall be available for public inspection in the office of the Secretary of the Interior, in Washington, District of Columbia.

(b) Notwithstanding any other provision of law, no Federal expenditures or financial assistance may be made available under any authority of Federal law, and no Federal license, permit, or other form of approval may be issued by any Federal agency for—

(1) the construction of any structure, facility, road, or related infrastructure;

(2) any road, bridge, airport, boat landing facility, or other facility to be used for providing access to any area in the Barrier Islands Protection System;

(3) flood insurance policies under the National Flood Insurance Act of 1968 (42 U.S.C. 1441), as amended, for structures in which construction had not commenced prior to May 8, 1980;

(4) any project to prevent the erosion of, or to otherwise stabilize, any shoreline or inshore area of such a barrier island: *Provided*, That this subsection shall not apply to activities related to energy development, navigational safety, public recreation, and protection of the barrier island ecosystem.

(c) The Secretary is authorized to make minor boundary revisions in the areas included as part of the Barrier Island Protection System.

Senator **Bumpers**. The first witness today is the Honorable A. R. "Babe" Schwartz, known to many of you in this room for his long interest in barrier islands. It is a pleasure to have you before us today, Senator Schwartz.

STATEMENT OF HON. A. R. SCHWARTZ, A STATE SENATOR FROM THE STATE OF TEXAS

Mr. **Schwartz**. Thank you, Mr. Chairman. Mr. Chairman, I am delighted to be here and I am pleased with the invitation to be able to testify. I am one of those people who have the good fortune—and perhaps the regret on occasion—to live on a barrier island. I happen to have been born on it. I live on Galveston Island. I was born there 53 years ago.

Your bill addresses a very serious concern of mine as a legislator that I have addressed in the 25 years that I have been in the Texas Legislature, four in the house, and as a member of the senate since 1960.

As author of most of our coastal legislation, including our coastal management program legislation to implement, and indeed in some cases to begin a coastal management program for Texas before the U.S. coastal management program was passed in 1972.

We on Galveston Island are well aware that perhaps people should have never begun to live on barrier islands in the first place, and a very serious concern of mine is that the habitation and growth of people on barrier islands would ultimately result in a substantial number of deaths as well as horrendous property losses in addition to the numbers of people who will die because of incentives that are constantly given to people to move onto barrier islands and live in a residential subdivision and have the beauties and pleasures of a leisure home right on the bay, on the Gulf of Mexico in Texas.

My district encompasses about half of the Texas coastline from the point at Highly Island to the middle of the Nuasis Countyship Channel which is in Corpus Christi. It includes some of the designated barrier islands in this proposal and on the maps and some islands within my district and peninsulas within my district are not included because of the dense habitation on those islands.

I think this record ought to begin by reflecting that the worst natural disaster in the history of the United States occurred on a barrier island. In 1900, a storm killed 6,000 people on Galveston Island, and that should have delivered a message to some people, and that is that you ain't supposed to live on no island, and I have said that time and time again.

The reason we live on Galveston Island is because it was the deep water port at that time for the entire Texas coast, and when the port city was wiped out in the 1900 storm, it was rebuilt because the economy of Texas and that area demanded the necessity of having that kind of a community.

Galveston Island is 32 miles long and 4 miles wide, and is not included in the maps as a barrier island here. It is one of those excluded areas because of habitation, and yet about half of the linear distance of the island is still under development. People are still building leisure homes. People are still obtaining insurance on those leisure homes, both wind and storm insurance and flood insurance, and there is a 100-percent chance that those homes will be destroyed and there is a pretty good chance some of the people in them will lose their lives unless they manage a new theory of evacuation which is not now in existence when a hurricane comes with that threat.

Our last hurricane was 17 years ago or 18 years ago now, Hurricane Carla in 1961, and I stayed on the island and I made a pledge to myself I was never going to stay on another island in a hurricane. I think that this bill is essentially what is needed in the land today to give people, No. 1, an adequate notice that barrier island peninsulas are not places for continued growth and habitation, but in fact are places for preservation and recreation, and for the utility of various uses consistent with the preservation of those islands in whatever state they exist.

Those areas that are now developed; nothing could or should be done about those perhaps except to protect the lives of the people involved. As a legislator and at the State level, I have tried to do that. I serve as chairman of the Senate Natural Resources Committee in the Texas Senate and as chairman of the Texas Coastal and Marine Council, which is a coastal oriented, quasi-legislative and executive agency, and in the process of passing the legislation, we have dealt with—we had to create a wind/storm pool in order for people to obtain wind/storm insurance on the gulf coast of Texas.

My concern about that now is that what we did in that bill was attempt to provide wind/storm insurance for people who wanted to preserve their homes and have a guarantee against an insurance loss that they couldn't recover from, and in order to provide insurance for people's homes, we additionally—and unthinkingly I think in that instance—provided great incentives for development in areas in which the risk is virtually uninsurable and should not be insured.

What has happened now is that we have a substantial wind/storm risk that is insured which is going to cost the taxpayers of Texas a substantial amount of money some day when the next hurricane hits the Texas coast, and in addition to that, each and every one of those people has flood insurance under a federally subsidized program which is going to cost the people of the United States substantial sums in addition to those already expended.

You and I know the figures, and the people in this room already know that the coastal loss last year was four times the premium collected in flood insurance, and four times the premium collected in flood insurance, is a figure, I think, for the United States. We had a flood loss in the Galveston, Harris County, Houston, Brazoria County from a tropical storm called Claudette last year and a subsequent rain storm a month or so later which followed Claudette and reflooded the same areas which contributed about, I think, $750 million to that flood loss for these areas.

Much of the development that occurs on the barrier islands and peninsulas is high-cost leisure home development for people who—at least in the old days—used to risk a certain amount of money to enjoy a pleasure which they could afford. What we have gotten into now in many instances is an invitation to people to indulge in a luxury at someone else's expense, and the someone else usually is either the insurance buying public who will carry that excess of loss in their increased insurance rates when those insurance rates go up after a substantial wind storm loss, or the public of the United States generally when the flood loss effect is finally felt under that great subsidy.

I think that the flood loss and the flood insurance program of the U.S. Government is the finest program that has ever been devised to ease the burden of those of us who live where we are because we must and because we are unable to insure against the risk that we face, but that flood loss protection ought not to be extended as an invitation to people to do haphazard and dangerous things in the future.

We have learned some great lessons since the flood insurance program was passed, and I think that this bill would at least give to the Nation a way to deal with the present undeveloped areas and to protect those areas from the same hazard that existed in the past.

I could go down the coast and point out several places on the Texas coast that are not included. I don't want to burden this committee's time with judgments about those islands, but your mapping program and your concerns for the Texas coast I think might well be taken up with some Texans, with of course Senator Bentsen and Senator Tower, from the standpoint of our peculiar island and peninsula situation in Texas, and with the various House Members who represent the coastal districts, and I would be happy to cooperate with your staff for any help or suggestions that I might be able to make with regard to the areas that you delineate for this bill and for the protective purposes.

I want to emphasize that I think it is going to be impossible as you do, and as this bill recognizes, to change the fact that 62,000 people or 70,000 people live on Galveston Island and almost all of it is a city now. I think it is also going to be impossible to change the tourist development impact on South Padre Island and North Padre Island, where tourist development is the major thrust of that area's economic well-being.

What I think must be considered, however, is how many more of those kinds of risks do we want to present to life and property in the U.S. coastline, and what part of the contribution do the taxpayers have to make to the economic well-being of developers as such who are the primary recipients of the benefits of that development.

The recreational aspect I think can be provided for and protected in the usual way, both by State park systems and national park systems. The National Seashore Park on Padre Island is a good example of a national acquisition of a large area that benefits hundreds of thousands of people yearly. Texas has an extensive beach/park program as well as a program that has included natural areas, and a park program for preservation of wetlands and for preservation of that very fragile environment on the islands and peninsulas.

We have a Sea Rim Park on the north end of the Texas coastline between Louisiana and Galveston, and it is principally a soft grass and marsh park. It is an area of hunting with minimal beaches. It is an area of limited hunting, but with wildlife propagation and wildlife management areas.

We have the State park in Galveston which is in excess of 2,000 acres which spans the island 4 miles wide and several miles on the beach front.

We have the Brian Beach Park, which is just down in the next county, the Mustang Island Park, which is the State park which was acquired from private ownership by parks and wildlife. We have the Matagorda State Park on Matagorda Island which includes the Matagorda Air Base and the Matagorda Island Federal properties which we included within a State park bill which I passed last session with one of my colleagues in the House of Representatives to incorporate both the 16,000 or 18,000 acres of State-owned lands and a matching amount of Federal lands which we acquire under management or grant from the Federal Government.

I indicated that the National Seashore Park exists on Padre Island, and our thrust there, I think, is to acquire areas that we can acquire within our own park system for additional recreational and wildlife management uses as parks, and to preserve those areas in the best way we can and utilize them for the public benefit.

I would hope that the Federal program moves in that same direction, because I think many of these areas are going to have to be acquired by the Federal Government if indeed preservation of their natural state and their wildlife habitat potential is going to occur.

Senator **Bumpers**. Senator Schwartz, let me thank you for your very articulate presentation. You are one of the best witnesses ever to appear before this committee, and you really have said everything that needs to be said on this.

You have certainly expressed my thoughts and my opinions and the reasons for introducing this bill. There isn't anything we can do about development that has already occurred because the horse is out of the barn on that. But if we don't do anything, the cost, for example, of flood insurance is just going to reach a staggering amount. I don't mean just the flood insurance, but the subsidies; $500 million in the last 3 years is what our cost has been for this disaster relief, flood insurance, and so on, and, as you correctly point out, we are paying four times the amount we collect.

Let me ask you, on Galveston Island, what is the population now, 60,000 to 70,000?

Mr. **Schwartz**. 60,000 to 70,000; in the city we expect the census to reflect about 70,000.

Senator **Bumpers**. What do you think the potential is on that island if they continue to develop it?

Mr. **Schwartz**. On a 32-mile long island, I might point out we have about 10 miles of seawall which was built at matching Federal, State, and local expense. In terms of construction cost, it is unlikely that the seawall will ever be extended, so everything down the island as we call the lower part of the island is at maximum 5-foot elevation and is unprotected by any seawall or barrier of any kind whatsoever. It floods rather regularly in the first stage of any hurricane.

If the areas continue to develop, you could wind up with 85,000, 90,000 people on the island, including the leisure home development, but my problem is that that leisure home development is not a leisure home development but indeed becomes a permanent home development. Those are now inexpensive homes, some of them, in relationship to building costs within the city, although it is all city now because it has all been annexed.

It is two different kinds of communities. These are all high-priced homes that you see pictures of, whether they are in Florida, Texas, or any place else. Their first floor is elevated to about 15 feet above the ground for protection from tidal flows, but interestingly enough, universally these people build these homes to some specification, not a specification which I believe will withstand hurricane wind forces, and in my judgment and the judgment of the people who inspected these areas on the Texas coast, this is all going to be 100-percent lost in any direct hit by a hurricane.

What they then do is come and fill in the lower floors and in that event after they solidify that structure, they guarantee its destruction from wave action, that those particular kinds of houses will survive a hurricane that is not a direct hit and they will survive certain wind forces and wave action that passes below the first level of a house, but they are making sure that that doesn't happen. They are putting in their playroom on the first floor and they are putting concrete block walls in, and they are really making very beautiful additions to those homes that will guarantee their destruction, and when they are destroyed, the cost is going to come out of the wind/storm catastrophe pool, which is nothing but a way of insuring everybody's risk, and the rates are going to go up 25 percent per year, which is our maximum, I think, under Texas law, and then the excess over what we can't recoup at a 25-percent rate increase will be spread out over in Texas among the 13½ million people that live there now in their insurance rates, and then the flood insurance rates are going to pick up a part of it, because traditionally what happens in a hurricane is that you start settling claims on the basis of wind. It is half hurricane wind force and half flood, so the flood insurance program will pay this part and the wind/storm portion will pay this part, but the truth is, we are insuring a guaranteed loss and we are insuring it at a rate that is less than an actuarial rate would demand or command in an insurance market.

Senator **Bumpers**. Senator Schwartz, would the elimination of flood insurance for future development virtually stop future development?

Mr. **Schwartz**. Elimination of flood insurance for future development would limit it. It would not stop it on the barrier islands and peninsulas because that is a leisure home development first.

Senator **Bumpers**. Some people will just go ahead.

Mr. **Schwartz**. They will assume that risk and the wind/storm risk is the one they perceive to be the greatest risk on the barrier islands.

See, my interest in the flood insurance program is a guarantee that we don't lose the flood insurance program for the people who so sorely need it for the protection of their permanent homes where people live, and they believe they are supposed to live and where they bought homes, being induced to believe they were safe in those homes. In many instances they were induced deceptively I might add, but I want to protect and preserve a subsidized Federal flood insurance program.

I do not want it lost for the benefit of what I call high-risk developments which are inconsistent with the original purpose of the flood insurance program. I know that is your aim because you are trying to protect that which exists against that which is potentially a threat to that.

Senator **BUMPERS**. I have two bases or aims. One is environmental, and one is financial. I want to save the islands, No. 1, and No. 2, I want to save the Government what I perceive to be a staggering sum of money if we aren't going to stop development on these islands.

Senator Johnston, do you have any questions?

Senator **JOHNSTON**. No, thank you. I am glad to have Senator Schwartz here, though.

Senator **BUMPERS**. Senator Johnston is a very strong supporter of this legislation.

Senator **JOHNSTON**. We want it for Texas, but not Louisiana.

Mr. **SCHWARTZ**. I saw my friend Vern Behrhorst and I told Vern that I knew you all didn't want anything in Louisiana and if you all wanted to give us anything, we would take it, but we didn't want to give you all anything, either.

Senator Bumpers. We can grandfather Louisiana out. Senator Johnston is going to come right along with us on this bill.

Mr. **SCHWARTZ**. Louisiana doesn't want and need flood insurance, either.

Senator **JOHNSTON**. We have a different problem. We have got deltaic lands. Most of them are incapable of being developed except Grand Isle, and it gets developed every 3 years and is wiped out by a hurricane every third year and they built it back. Most of the things are rather temporary there, but Louisiana is different, Mr. Chairman, I think.

Senator **BUMPERS**. I understand.

Mr. **SCHWARTZ**. Traditionally, that has been agreed on. It has a different coastline. Every State has a different coastline. That is why I think it is important for you gentlemen to work with the individual Senators from each State to analyze their particular job.

Senator **JOHNSTON**. We might help you with yours.

Mr. **SCHWARTZ**. Our State coastline is so long, as I pointed out in my testimony, that we have different conditions on different islands. I live on Galveston Island, and we live there of necessity because it was the deep-water port that Texas had. About the time we found out it wasn't entirely safe to live there, we had already been born and raised there and so we stayed there.

A lot of other people come there and we invite them to do that, but we would like to tell them what the risk is.

Senator **BUMPERS**. I would like to spend all morning with you because you are obviously one of the most knowledgeable people in the country on this problem. As I pointed out in my opening statement, we have such a host of witnesses we have got to get on with it.

We certainly appreciate your appearance here this morning, and we will stay in constant touch with you. Any additional comments you wish to make, I will be as close as the telephone.

Mr. **Schwartz**. I appreciate that very much. The Texas Coastal Marine Council is meeting on Mustang Island, one of the other barrier islands, on June 20, and I am going to suggest to them that we take an interest in this legislation and if we can do it, to be supportive of the legislation on the State level through our Texas delegation.

Senator **Bumpers**. Thank you again, Senator. Our next witness is Robert L. Herbst, Assistant Secretary of the Department of the Interior. Mr. Secretary, welcome.

Mr. **Herbst**. Thank you very much, Mr. Chairman.

Senator **Bumpers**. Let me make an additional opening statement and that is we also have a couple of very important votes coming up so we will have to adjourn. We will have to adjourn temporarily at some point and we will interrupt these proceedings, but in any event, Bob, why don't you proceed?

STATEMENT OF ROBERT L. HERBST, ASSISTANT SECRETARY FOR FISH AND WILDLIFE AND PARKS, DEPARTMENT OF THE INTERIOR; ACCOMPANIED BY RONALD COOKSY, NATURAL RESOURCES PLANNER, HERITAGE CONSERVATION AND RECREATION SERVICE, DEPARTMENT OF THE INTERIOR

Mr. **Herbst**. Thank you, Mr. Chairman, and in line with your time needs, I will highlight my opening statement and ask that it be placed in the record in its entirety.

Senator **Bumpers**. It will be.

Mr. **Herbst**. I would also ask, Mr. Chairman, that the study completed by the Department and the draft evironmental impact statement as well as a recent speech that I gave at the Barrier Islands Conference be introduced into the record.

Mr. Chairman, we appreciate the opportunity to present the views of the Department of the Interior and the administration on S. 2686 and to also compliment you and the committee for focusing attention on this most important issue.

The bill establishes a Barrier Islands Advisory Council which would be chaired by the Secretary of the Interior to study and to make recommendations with respect to Federal actions that affect the barrier islands.

In addition, the bill would prohibit Federal expenditures, financial assistance, and the issuance of Federal permits for construction, flood insurance and the stabilization of undeveloped barrier islands with the exception of energy development, navigational safety, public recreation and protection of the barrier island ecosystem.

Mr. Chairman, although we do not yet know what the best role for the Federal Government is in protecting the barrier islands, S. 2686 is one of the approaches we are considering and it does embody much of the concern and recommendations of our study.

The administration does request that Congress defer consideration of the barrier islands legislation until we have completed the comprehensive study on the barrier islands as requested by the President in his environmental message. To do otherwise in our judgment would prejudge our legal and public input process.

The President will receive the final recommendations from the Department of the Interior in November of this year. The administration does share strongly the concern of this committee with regard to the barrier islands. Our Department through programs of the National Park Service and the Fish and Wildlife Service, has developed an understanding of the natural processes of the barrier islands that we believe is without parallel.

The barrier island study that was assigned to HCRS is a further reflection of our concern. During the past decade, we have also undertaken and sponsored a multifaceted program of research which is continually expanding our understanding of the barrier island environment and the unique constraints that the environment places on its development and its ultimate use.

The barrier islands of our country are among the most significant coastal features of the U.S. east coast from Maine to Texas. Typically the islands are elongated, narrow landforms that consist of unconsolidated and shifting sands. They are generally characterized by a dynamic beach system that consists of offshore bars, crashing surf, a sand beach, dune ridges just behind the beach, and interior lowlands and bayside wetlands.

The barrier islands are so named because they protect the lagoons, salt marshes, and the estuarine systems and the mainland from the direct attack of ocean waves and storm surges. From Long Island south, over 75 percent of the general shoreline of the east and gulf coast is fronted with barrier islands. They create extensive areas of estuarine habitat. Not only do these barrier islands create extensive areas of habitat, and provide the needed protection which is essential for nursery and other functions of estuarines, the inlets, through which these structures regulate the flow of the salt water, are necessary to create the saline gradient and define the location of ingress and egress for the organisms that are dependent on this area.

It is estimated that during some stage of their life history, up to 90 percent of all fish caught on the coast are dependent upon the estuaries created and maintained by the barrier structures. These islands also provide the major wintering and migration staging areas for migratory birds, including waterfowl, songbirds and raptors, including the endangered peregrine falcon, and, of course, huge populations of nesting shorebirds and herons and other wading birds are common.

The intertidal zone is a major source of food not only for shore birds but for several species of fish which are important to both commercial and sport interests.

Sea turtles, most of which are listed as endangered, are totally dependent upon the beach areas for nesting. Most of the disruption from unwise use of these islands would affect all of the fish and wildlife resources which are vulnerable to human development, and that, of course, Mr. Chairman, includes people, as a large number of people inhabit the barrier islands and many others continue to seek living space on them. Some such as Miami Beach, supply homes and jobs for thousands of our citizens. Others, such as Cape Cod, provide numerous opportunities for recreation to millions of visitors each year.

The diversity of these areas attracts many people, and their use varies consistent with the complex tastes of the American public. Wise decisions concerning the use of current undeveloped areas are necessary so that both the public welfare and the economic well-being can be enhanced and poor Federal investment can be avoided.

Over 25 percent, Mr. Chairman, of our Nation's population lives within 100 miles of the Atlantic and the gulf coast barrier islands. Our request for a delay, Mr. Chairman, is not because we think barrier island protection is not important. On the contrary, we think the protection of barrier islands is one of the most significant resource and development issues for the administration and Congress to address, but because we think the issues involved are complex, they deserve the time and effort necessary to identify and analyze them.

Let me share some of the problems that we see with the current legislative approaches. There are in place two statutes that deal directly with these sensitive areas. The first is the Coastal Zone Management Act. As today's testimony indicates, the Department of Commerce is actively working with the States to insure that unwise development does not occur on barrier islands.

Second, the Corps of Army Engineers has the responsibility for several permitting programs which can provide protection for barrier islands, under section 404 of the Clean Water Act, the Ocean Dumping Act, and several others. A determination that a proposed activity is in the public interest is required before permits can be granted for dredging, for deposition of material, for affecting wetlands and for the construction of piers, dikes, jetties, or other similar activities that affect barrier islands.

Coupled with these acts, the President has recently issued two Executive orders, one on flood plain management and the other on wetlands protection. Both apply to all barrier islands both directly and indirectly.

These two orders establish Federal policies that are designed to avoid adverse effects on wetlands and flood plains, to minimize destruction, loss or degradation of wetlands and flood plains. Their goal is to reduce the risk of flood loss, to minimize the impact of floods on human safety and health and welfare, and to restore the natural and beneficial values that are served by flood plains.

The implementation of these Executive orders by the Federal Government is currently underway. The progress of this action is currently under review by the Executive Office of the President, and by the Water Resources Council. The effective implementation, we believe, will substantially improve the protection of our barrier islands' wetlands, and the barrier islands themselves, most of which lie within the 100-year floodplain.

Mr. Chairman, we would also point out that there may be few immediate budgetary savings that are associated with prohibiting Federal assistance on these areas. The demand for waste water treatment, sewer and other grants far outstrips the Government's ability to fund them, and removing these areas from competition will only redirect funds that might have been spent on them to another area. However, I personally comment that in many cases, this is the wise thing to do. There are long-term economic savings that would accrue from not encouraging development. It is these concerns that are highlighted in my testimony that argue for waiting for the study process to be completed.

The public comment period on the draft EIS ended April 7. 1980. The draft EIS contained nearly 100 options related to the protection of barrier islands, including the codification of the Executive orders that I mentioned, item by item specific measures for specific barrier islands or island types, the prohibition of Federal expenditures, financial assistance, and the issuance of Federal permits for construction, flood insurance, and the stabilization of undeveloped barrier islands which your bill addresses, and the extent to which the current coastal zone management authorities may provide sufficient protection.

Our review, Mr. Chairman, of the comments that have been received indicates that there is a great deal of support for the protection of the undeveloped barrier islands.

In the President's 1979 environmental message, he directed that the Secretary of Commerce conduct a systematic review of Federal programs that significantly affect the coastal resources and that includes the undeveloped barrier islands.

That study is underway, and I understand that the results will be available this summer. The Commerce study, looking at all coastal areas, and our study which focuses on the undeveloped barrier islands, are working in harmony to provide the President the information that is needed to develop positive public policy on these precious resources.

Mr. Chairman, in summary, while barrier islands and their protection is extremely important, the administration feels that consideration of any bill which changes the Federal permitting process and certainly one which authorizes major land acquisition ought to be deferred.

Mr. Chairman, that concludes the highlighting of my statement. Ron Cooksy, our staff specialist, and will be pleased to address any questions you have.

Senator **Bumpers**. Mr. Secretary, I probably will submit most of my questions to you in writing in the interest of time, but let me just ask you this.

How many public responses did you get on the EIS?

Mr. **Cooksy**. We received several hundred public responses. We sent out 2,500 copies of the statement. More than half of those went to the general public.

Senator **Bumpers**. How about the Federal agencies?

Mr. **Herbst**. We submitted to 22 Federal departments and agencies, Mr. Chairman. We received a response from all but four at the present time. The tenor of the responses varied according to the agency's mission, but throughout the responses there was a theme of recognition for Federal leadership and a uniform, consistently applied Federal policy as it applies to barrier islands.

The four that have not responded are the Small Business Administration, Agriculture, Energy, and ICC.

Senator **Bumpers**. When did you expect to make the recommendations to the President that were ordered in 1977?

Mr. **Herbst**. Mr. Chairman, I will submit for the record the time schedule which includes both the decision documents and the completion of the EIS. Let me highlight it for you now.

On June 16 we will complete the draft decision documents; September 1, the final environmental impact statement will be printed. It will be distributed for a 30-day public review and comment period which will end on October 29. Following this period, we will finalize both the EIS and decision documents. Secretary of the Interior Andrus will act on it November 12. We expect to have the final recommendations to the President on November 18.

Senator **Bumpers**. Does the administration favor the acquisition provisions of H.R. 5981?

Mr. **Herbst**. Mr. Chairman, we think that acquisition is one of the tools to protect barrier islands, but we believe it is not the only tool to protect barrier islands.

Senator **Bumpers**. Did you hear Senator Schwartz say that anything short of that, there is going to be a large number of people willing to assume the risk and go ahead with the development anyway?

Mr. **Herbst**. I understand that may be the case.

Senator **Bumpers**. You just take flood insurance and use the permitting process and that sort of thing. You heard what he said. Doesn't that really defeat one of your purposes and mine, too?

Mr. **Herbst**. Personally, of course, I would like to buy them all, but I don't think it is possible.

Senator **Bumpers**. Senator Johnston.

Senator **Johnston**. Thank you, Mr. Chairman. Mr. Herbst, are you familiar with the work in Louisiana that has been done through its coastal zone management?

Mr. **Herbst**. Yes, sir.

Senator **Johnston**. We have some experimental work being done which seems to indicate that some kind of structures on our kind of deltaic land will tend to save the islands.

Are you familiar with that?

Mr. **Herbst**. Yes.

Senator **Johnston**. I made the point earlier that deltaic lands are different and I want to make a point right now that we don't want to have development and homes built on our deltaic lands other than Grand Isle, which is a traditional use, but we do want to be able to build and continue to build and experiment with these structures because we think that it may work.

Do you think that your final studies will tend to support that conclusion?

Mr. **Herbst**. Mr. Chairman, Senator Johnston, as I highlighted briefly, our study options also included a section which is an item-by-item or case-by-case analysis. Some islands need complete protection with no development at all. Some kinds of structures and some kinds of development in the right place, done the right way can be satisfactory in some instances, but we do address that in our study.

Senator **Johnston**. In the HCRS study I notice you do not have the Pacific Coast at all even though there are some barrier islands there.

Is that because they are different geologically?

Mr. **Cooksy**. We recognize the fact that there are barrier islands elsewhere, Senator. We specifically focused on the east and gulf coasts because of the President's charge in his environmental message of 1977.

The President asked the Secretary to prepare a plan for the Atlantic and gulf coast islands.

Senator Johnston. Do you know why he left out the Pacific Coast?

Mr. Cooksy. No, sir, I do not.

Mr. Herbst. There are barrier islands there as well as off the coast of Alaska and off some of the coasts of the Great Lakes, particularly my home State. There are some off the coast of Lake Superior.

Senator Johnston. Thank you very much.

Senator Bumpers. Mr. Herbst, all up and down the gulf coast, sometimes out of sight of land even, people are building homes on stilts out there.

Is flood insurance extended to them?

Mr. Herbst. I guess we would have to defer on that.

Senator Bumpers. Do you know the answer to that, Senator Johnston?

Senator Johnston. I don't think so.

Mr. Herbst. I don't believe it does, but I think we should defer that.

Senator Bumpers. Is there any kind of regulation or control in the building of those homes just out of fairly shallow water?

Mr. Herbst. Just locally, by governmental units that are involved, and then some recommendations to use round piers rather than square piers because the effect of the storm isn't as great, but from what I have seen, most of them get wiped out every few years and they reconstruct.

Senator Johnston. Our coastal zone management plan addresses that problem, and I think it prohibits, Vernon, prohibits it? We prohibit it.

Senator Bumpers. Do you? How many coastal zone management plans have been approved? How many States have submitted them and had them approved?

Mr. Herbst. I believe it is 19, Mr. Chairman, but we will double-check and correct that if it is wrong.

Senator Bumpers. Thank you very much, Mr. Herbst. We will probably submit some additional questions to you.

[The prepared statement, time schedule, study by the Department, and a speech before the Barrier Islands Conference submitted by Mr. Herbst follow:]

STATEMENT OF ROBERT L. HERBST, ASSISTANT SECRETARY FOR FISH AND WILDLIFE AND PARKS, DEPARTMENT OF THE INTERIOR, BEFORE THE SENATE SUBCOMMITTEE ON PARKS, RECREATION AND RENEWABLE RESOURCES, ON S. 2686, A BILL TO DIRECT THE SECRETARY OF THE INTERIOR TO PROVIDE FOR THE PROTECTION OF THE BARRIER ISLANDS, AND FOR OTHER PURPOSES.

JUNE 12, 1980

MR. CHAIRMAN, I APPRECIATE THE OPPORTUNITY TO PRESENT THE VIEWS OF THE DEPARTMENT OF THE INTERIOR ON S. 2686. THE BILL ESTABLISHES A BARRIER ISLANDS ADVISORY COUNCIL, CHAIRED BY THE SECRETARY OF THE INTERIOR, TO STUDY AND MAKE RECOMMENDATIONS WITH RESPECT TO FEDERAL ACTIONS AFFECTING THE BARRIER ISLANDS. IN ADDITION, THE BILL WOULD PROHIBIT FEDERAL EXPENDITURES, FINANCIAL ASSISTANCE, AND THE ISSUANCE OF FEDERAL PERMITS FOR CONSTRUCTION, FLOOD INSURANCE, AND STABILIZATION OF UNDEVELOPED BARRIER ISLANDS, EXCEPT FOR ENERGY DEVELOPMENT, NAVIGATIONAL SAFETY, PUBLIC RELATION AND PROTECTION OF THE BARRIER ISLAND ECOSYSTEM.

MR. CHAIRMAN, ALTHOUGH WE DO NOT YET KNOW WHAT THE BEST ROLE IS FOR THE FEDERAL GOVERNMENT IN PROTECTING BARRIER ISLANDS, AND S. 2686 IS ONE OF THE APPROACHES WE ARE CONSIDERING, WE STRONGLY REQUEST THAT THE CONGRESS DEFER CONSIDERATION OF ANY BARRIER ISLANDS LEGISLATION UNTIL WE HAVE COMPLETED THE COMPREHENSIVE STUDY ON BARRIER ISLANDS REQUESTED BY THE PRESIDENT IN HIS 1977 ENVIRONMENTAL MESSAGE.

THE ADMINISTRATION SHARES THE CONCERN OF THIS COMMITTEE WITH REGARD TO THE BARRIER ISLANDS. THE DEPARTMENT OF THE INTERIOR, THROUGH THE PROGRAMS OF THE NATIONAL PARK SERVICE AND FISH AND WILDLIFE SERVICE, HAS DEVELOPED AN UNDERSTANDING OF THE NATURAL PROCESSES OF BARRIER ISLANDS THAT IS WITHOUT PARALLEL. THE BARRIER ISLAND STUDY ASSIGNED TO HCRS IS A FURTHER REFLECTION OF OUR CONCERN. DURING THE PAST DECADE, WE HAVE ALSO UNDERTAKEN AND SPONSORED A MULTI-FACETED PROGRAM OF RESEARCH WHICH IS CONTINUALLY EXPANDING OUR UNDERSTANDING OF THE BARRIER ISLAND ENVIRONMENT AND THE UNIQUE CONSTRAINTS THE ENVIRONMENT PLACES ON DEVELOPMENT AND USE.

BARRIER ISLANDS ARE AMONG THE MOST SIGNIFICANT COASTAL FEATURES OF THE U.S. EAST COAST FROM MAINE TO TEXAS. TYPICALLY, THE ISLANDS ARE ELONGATED, NARROW LANDFORMS CONSISTING OF UNCONSOLIDATED AND SHIFTING SAND. THEY ARE GENERALLY CHARACTERIZED BY A DYNAMIC BEACH SYSTEM CONSISTING OF OFF-SHORE BARS, CRASHING SURF, A SAND BEACH, DUNE RIDGES JUST BEHIND THE BEACH, INTERIOR LOWLANDS AND BAY-SIDE WETLANDS. BARRIER ISLANDS ARE SO NAMED BECAUSE THEY PROTECT LAGOONS, SALT MARSHES, ESTUARINE SYSTEMS AND THE MAINLAND FROM THE DIRECT ATTACK OF OCEAN WAVES AND STORM SURGES. FROM LONG ISLAND SOUND, OVER 75 PERCENT OF THE GENERAL SHORELINE OF THE EAST AND GULF COASTS IS FRONTED WITH BARRIER ISLANDS, CREATING EXTENSIVE AREAS OF ESTUARINE HABITAT. NOT ONLY DO THESE BARRIER ISLANDS PROVIDE THE PROTECTED ENVIRONMENT ESSENTIAL FOR THE NURSERY AND OTHER NATURAL FUNCTIONS OF ESTUARIES, THE INLETS THROUGH THESE STRUCTURES REGULATE THE FLOW OF SALT WATER NECESSARY TO CREATE THE ESSENTIAL SALINITY GRADIENT AND TO DEFINE THE LOCATION OF INGRESS AND EGRESS FOR ESTUARINE-DEPENDENT ORGANISMS. IT IS ESTIMATED THAT, DURING SOME STAGE OF THEIR LIFE HISTORY, UP TO 90 PERCENT OF ALL FISH CAUGHT ON THESE COASTS ARE DEPENDENT UPON ESTUARIES CREATED AND MAINTAINED BY THESE BARRIER STRUCTURES. THESE ISLANDS PROVIDE MAJOR WINTERING AND MIGRATION STAGING AREAS FOR MIGRATORY BIRDS, INCLUDING WATERFOWL, SONGBIRDS AND RAPTORS SUCH AS THE ENDANGERED PEREGRINE FALCON. HUGE POPULATIONS OF NESTING SHOREBIRDS AND LARGE ROOKERIES OF HERONS AND OTHER WADING BIRDS ARE COMMON. THE INTERTIDAL ZONE IS A MAJOR SOURCE OF FOOD, NOT ONLY FOR SHOREBIRDS, BUT ALSO FOR SEVERAL SPECIES OF FISH IMPORTANT TO BOTH COMMERCIAL AND SPORT FISHERMEN. SEA TURTLES, MOST OF WHICH ARE LISTED AS ENDANGERED, ARE TOTALLY DEPENDENT UPON BEACH AREAS FOR NESTING. WHILE TURTLE AND SHOREBIRD NESTING ACTIVITIES ARE PARTICULARLY SUSCEPTIBLE TO DISRUPTION FROM UNWISE USE OF THESE ISLANDS, ALL OF THESE FISH AND WILDLIFE RESOURCES ARE VULNERABLE TO HUMAN DEVELOPMENT.

A LARGE NUMBER OF PEOPLE INHABIT BARRIER ISLANDS AND MANY OTHERS CONTINUE TO SEEK LIVING SPACE ON THEM. SOME, SUCH AS MIAMI BEACH, PROVIDE HOMES AND JOBS FOR THOUSANDS OF OUR NATION'S CITIZENS. OTHERS, SUCH AS CAPE COD, PROVIDE NUMEROUS OPPORTUNITIES FOR RECREATION TO MILLIONS OF VISITORS EAC YEAR. THE DIVERSITY OF THESE AREAS ATTRACTS MANY PEOPLE AND THEIR USE VARIES CONSISTENT WITH THE COMPLEX TASTES OF THE AMERICAN PUBLIC. WISE DECISIONS CONCERNING THE USE OF THE CURRENTLY UNDEVELOPED AREAS ARE NECESSARY, SO THAT PUBLIC WELFARE AND ECONOMIC WELL-BEING CAN BE ENHANCED AND POOR FEDERAL INVESTMENT CAN BE AVOIDED.

OUR REQUEST FOR DELAY IS NOT BECAUSE WE THINK BARRIER ISLAND PROTECTION IS NOT IMPORTANT, BUT BECAUSE WE THINK THE ISSUES INVOLVED ARE COMPLEX AND DESERVE THE TIME AND EFFORT WE HAVE EXPENDED IN IDENTIFYING AND ANALYSING THEM.

LET ME SHARE SOME OF THE PROBLEMS WE SEE WITH THE CURRENT LEGISLATIVE APPROACHES. FIRST, THERE IS THE QUESTION OF URGENCY. THERE ARE IN PLACE TWO STATUTES THAT DIRECTLY DEAL WITH THESE SENSITIVE AREAS. THE FIRST IS THE COASTAL ZONE MANAGEMENT ACT. AS TODAY'S TESTIMONY INDICATES, THE DEPARTMEN OF COMMERCE IS ACTIVELY WORKING WITH THE STATES TO ENSURE THAT UNWISE DEVELOPMENT DOES NOT OCCUR ON BARRIER ISLANDS. SECOND, THE CORPS OF ENGINEERS HAS RESPONSIBILITY FOR SEVERAL PERMIT PROGRAMS WHICH PROVIDE PROTECTION FOR BARRIER ISLANDS UNDER SECTION 404 OF THE CLEAN WATER ACT, THE OCEAN DUMPING ACT, AND OTHERS. A DETERMINATION THAT A PROPOSED ACTIVITY IS IN THE PUBLIC INTEREST IS REQUIRED BEFORE PERMITS CAN BE GRANTED FOR DREDGING, DEPOSITING OF DREDGED OR OTHER MATERIAL IN WETLANDS OR OPEN WATER, CONSTRUCTING OF PIERS, DIKES OR JETTIES, OR SIMILAR ACTIVITIES AFFECTING BARRIER ISLANDS.

COUPLED WITH THESE ACTS, THE PRESIDENT HAS ISSUED TWO EXECUTIVE ORDERS--11988 (FLOODPLAINS MANAGEMENT) AND 11990 (WETLANDS PROTECTION) THAT APPLY TO ALL BARRIER ISLANDS, BOTH DIRECTLY AND INDIRECTLY.

THESE TWO EXECUTIVE ORDERS ESTABLISH FEDERAL POLICIES DESIGNED TO AVOID ADVERSE IMPACT ON WETLANDS AND FLOODPLAINS, TO MINIMIZE DESTRUCTION, LOSS OR DEGRADATION OF WETLANDS AND FLOODPLAINS. THEIR GOAL IS ALSO TO REDUCE THE RISK OF FLOOD LOSS, TO MINIMIZE THE IMPACT OF FLOODS ON HUMAN SAFETY, HEALTH, AND WELFARE, AND TO RESTORE THE NATURAL AND BENEFICIAL VALUES SERVED BY FLOODPLAINS. BOTH APPLY TO FEDERAL RESPONSIBILITIES FOR (1) ACQUIRING, MANAGING, AND DISPOSING OF FEDERAL LANDS AND FACILITIES; (2) PROVIDING FEDERALLY UNDERTAKEN, FINANCED, OR ASSISTED CONSTRUCTION AND IMPROVEMENTS; AND (3) CONDUCTING FEDERAL ACTIVITIES AND PROGRAMS AFFECTING LAND USE, INCLUDING BUT NOT LIMITED TO WATER AND RELATED LAND RESOURCES PLANNING, REGULATING, AND LICENSING ACTIVITIES. BOTH ORDERS REQUIRE FEDERAL AGENCIES TO AVOID, TO THE EXTENT POSSIBLE, LONG AND SHORT TERM ADVERSE IMPACTS OF ACTIONS IN FLOODPLAINS AND WETLANDS AND TO AVOID DIRECT OR INDIRECT SUPPORT OF FLOODPLAIN DEVELOPMENT OR NEW CONSTRUCTION IN WETLANDS WHENEVER THERE IS A PRACTICABLE ALTERNATIVE. FURTHERMORE, FEDERAL AGENCIES ARE DIRECTED TO EXERCISE LEADERSHIP TO ASSURE THAT THESE EXECUTIVE ORDERS ARE UNDERSTOOD AND INCORPORATED INTO STATE, FEDERAL AND LOCAL PROGRAMS AFFECTING FLOODPLAINS OR WETLANDS.

IMPLEMENTATION OF THESE EXECUTIVE ORDERS BY THE FEDERAL GOVERNMENT IS CURRENTLY UNDERWAY. THE PROGRESS OF THIS ACTION IS CURRENTLY UNDER REVIEW BY THE EXECUTIVE OFFICE OF THE PRESIDENT AND THE WATER RESOURCES COUNCIL. EFFECTIVE IMPLEMENTATION WILL, WE BELIEVE, SUBSTANTIALLY IMPROVE THE PROTECTION OF OUR BARRIER ISLAND WETLANDS AND BARRIER ISLANDS THEMSELVES, MOST OF WHICH LIE WITHIN THE 100 YEAR FLOODPLAIN.

OUR SECOND CONCERN IS WITH THE DEFINITION USED IN PREPARING THE MAPS REFERENCED IN THE LEGISLATION. THE PRESIDENT'S 1977 ENVIRONMENTAL MESSAGE MENTIONED 68 UNSPOILED ISLANDS, FOCUSING ON ECOSYSTEM. THE OVER 180 AREAS INCLUDED IN THE LEGISLATION ARE MOSTLY SPITS AND BAY BARRIERS, NOT ISLANDS AND MANY HAVE DEVELOPED AREAS ADJACENT TO THEM. THERE APPEAR TO BE SERIOUS QUESTIONS OF EQUITY IN SIMPLY DRAWING LINES ON MAPS TO CONFORM WITH AN ARBITRARY DEFINITION OF SIZE WITH REGARD TO THE RELATIONSHIP BETWEEN SIZE AND PROTECTION OF IMPORTANT ECOSYSTEMS. IN ADDITION, THERE IS THE QUESTION OF THE QUALITY OF THE RESOURCES BEING PROTECTED AND THE ACTUAL THREATS TO DEVELOPMENT. THE MAPS, TAKEN ALONE, ONLY PROVIDE ONE ASPECT OF THE ISSUE AND RELIANCE UPON THEM FOR DECISIONMAKING IN THE ABSENCE OF THE COMPLETED EIS AND A FULL CONSIDERATION OF ALL FEASIBLE OPTIONS, IS, IN OUR VIEW, INAPPROPRIATE. DEVELOPMENT OF THE FINAL EIS IS NOW UNDERGOING REVIEW WITHIN THE DEPARTMENT. THE SECRETARY'S REPORT TO THE PRESIDENT SHOULD BE SUBMITTED THIS FALL AND IT WILL REFLECT OUR FINAL RECOMMENDATIONS CONCERNING FUTURE PROTECTION OF THE ATLANTIC AND GULF COAST BARRIER ISLANDS.

THIRD, WE ARE CONCERNED ABOUT CERTAIN UNINTENDED EFFECTS THIS LEGISLATION MIGHT CAUSE. FOR INSTANCE, WE CAN ENVISION A NUMBER OF NEEDED AND WORTHWHILE PROJECTS WHICH COULD BE HALTED BY THE LANGUAGE IN THIS BILL. FOR EXAMPLE, WHERE A BARRIER ISLAND IS BREACHED IN A STORM, THE EFFECT OF SUCH A BREACH COULD EXTEND TO THE WATERS AND COASTLINE LYING BEHIND THE BARRIER ISLAND. IF THOSE WATERS ARE USED FOR NAVIGATION, SUCH AS THE GULF OR INTERCOASTAL WATERWAYS, ONE COULD ARGUABLY MAKE REPAIRS CITING THE "NAVIGATIONAL SAFETY" LANGUAGE IN THE PROVISION. CONVERSELY, IF THE WATERS BEHIND ARE NOT USED FOR NAVIGATION, NO REPAIRS WOULD BE POSSIBLE EVEN THOUGH THE BREACH COULD RESULT IN A SERIOUS INCREASE IN FLOOD HAZARD TO THE INLAND COASTLINE. A SIMILAR PROBLEM ARISES WITH RESPECT TO STRUCTURES SUCH AS JETTIES CONSTRUCTED ON OR ADJACENT TO BARRIER ISLANDS. IN MANY CASES SUCH STRUCTURES ARE THE

MOST EFFECTIVE MEANS OF PROVIDING PROTECTION TO NAVIGATION LANES OR INLAND COASTAL AREAS FROM THE EFFECTS OF STORMS OR EROSION. THE LANGUAGE IN THE BILL WOULD ARGUABLY ONLY ALLOW CONSTRUCTION OF THOSE PROJECTS WHICH COULD RELATE TO NAVIGATIONAL SAFETY. FURTHERMORE, WE QUESTION THE WISDOM OF EXCLUDING FROM THE COVERAGE OF SUBSECTION 3(b) ONLY THOSE NAVIGATION ACTIVITIES RELATED TO SAFETY. THERE ARE A NUMBER OF CIRCUMSTANCES WHERE A PROJECT MAY PROVIDE A SIGNIFICANT AID TO NAVIGATION BUT NOT NECESSARILY FROM A PURELY SAFETY STANDPOINT. THESE KINDS OF ISSUES WILL BE ADDRESSED IN ANY RECOMMENDATION WE MAKE TO THE PRESIDENT.

WE MUST ALSO POINT OUT THAT THERE WILL BE FEW IF ANY BUDGETARY SAVINGS ASSOCIATED WITH PROHIBITING FEDERAL ASSISTANCE ON THESE AREAS. THE DEMAND FOR WASTE WATER TREATMENT, SEWER, AND OTHER GRANTS FAR OUTSTRIPS THE GOVERNMENT'S ABILITY TO FUND THEM, AND REMOVING THESE AREAS FROM COMPETITION WILL ONLY REDIRECT ANY FUNDS THAT MIGHT HAVE BEEN SPENT ON THEM TO SOME OTHER AREA.

IT IS THESE CONCERNS THAT ARGUE FOR WAITING FOR OUR STUDY PROCESS. THE PUBLIC COMMENT PERIOD ON THE DRAFT EIS ENDED APRIL 7, 1980. THE DRAFT EIS CONTAINED NEARLY 100 OPTIONS RELATING TO THE PROTECTION OF BARRIER ISLANDS, INCLUDING CODIFICATION OF EXECUTIVE ORDERS 11988 (FLOODPLAINS MANAGEMENT) AND 11990 (WETLANDS PROTECTION); ITEM SPECIFIC MEASURES FOR SPECIFIC BARRIER ISLANDS OR ISLAND TYPES; PROHIBITION OF FEDERAL EXPENDITURES, FINANCIAL ASSISTANCE, AND THE ISSUANCE OF FEDERAL PERMITS FOR CONSTRUCTION, FLOOD INSURANCE AND STABILIZATION OF UNDEVELOPED BARRIER ISLANDS; AND THE EXTENT TO WHICH CURRENT CZM AUTHORITIES MAY PROVIDE SUFFICIENT PROTECTION. OUR REVIEW OF THE COMMENTS RECEIVED INDICATES A GREAT DEAL OF SUPPORT FOR THE PROTECTION OF UNDEVELOPED BARRIER ISLANDS.

IN THE PRESIDENT'S 1979 ENVIRONMENTAL MESSAGE LAST AUGUST, HE DIRECTED THE SECRETARY OF COMMERCE TO CONDUCT A SYSTEMATIC REVIEW OF FEDERAL PROGRAMS THAT SIGNIFICANTLY AFFECT COASTAL RESORUCES, WHICH CERTAINLY INCLUDES THESE UNDEVELOPED BARRIER ISLANDS. THIS STUDY IS UNDERWAY, AND I UNDERSTAND SOME RESULTS FROM IT WILL BE AVAILABLE THIS SUMMER. THE COMMERCE STUDY, LOOKING AT ALL COASTAL AREAS, AND OUR STUDY, FOCUSING ON UNDEVELOPED BARRIER ISLANDS, ARE WORKING IN HARMONY TO PROVIDE THE PRESIDENT THE INFORMATION THAT IS NEEDED TO DEVELOP POSITIVE PUBLIC POLICY ON THESE PRECIOUS RESOURCES.

IN SUMMARY, MR. CHAIRMAN, WHILE BARRIER ISLANDS ARE IMPORTANT, WE THINK CONSIDERATION OF ANY BILL WHICH CHANGES THE FEDERAL PERMITTING PROCESS, AND CERTAINLY ONE WHICH AUTHORIZES MAJOR FEDERAL LAND ACQUISITIONS, IS PREMATURE AND SHOULD BE DEFERRED.

THIS CONCLUDES MY PREPARED STATEMENT. I WOULD BE HAPPY TO ANSWER ANY QUESTIONS THE COMMITTEE MAY HAVE AT THIS TIME.

Revised Schedule to Complete the Coastal Barrier Islands FEIS/SID

Elapsed Time	Work Element
Start-up.....September 15, 1980	Establish interagency team to develop FEIS/SID (Team membership: representatives from NPS, FWS, COE, OCZM, FEMA -- Jack Hauptman, HCRS, to serve as team member)
3rd Week	Complete draft SID
4th Week *	A/S-FWP, CEQ, and OEPR complete review of draft SID
6th Week	Revise draft SID per comments and begin finalizing FEIS
7th Week *	Department complete review of draft SID
9th Week	Complete draft FEIS
10th Week *	A/S-FWP and A/S-PBA clear FEIS
14th Week ***	FEIS printed and distributed
18th Week **	30 day comment period ends
20th Week	Finalize SID
21st Week *	Department clears SID
22nd Week	Transmit SID to Secretary

* Time schedule for review and concurrence by Executive agencies is extremely optimistic.

** 30 day minimum time prescribed by regulations

*** Surcharge on printing will probably be required to meet schedule

Department of the Interior

Alternative Policies for Protecting Barrier Islands Along the Atlantic and Gulf Coasts of the United States

and

Draft Environmental Statement

Prepared by:

Heritage Conservation and Recreation Service

in conjunction with:

National Park Service

Fish and Wildlife Service

Office of Coastal Zone Management

Council on Environmental Quality

Department of the Interior

Alternative Policies for Protecting Barrier Islands Along the Atlantic and Gulf Coasts of the United States

and

Draft Environmental Statement

DES 80-1

Prepared by:
Heritage Conservation and Recreation Service
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Fish and Wildlife Service
Office of Coastal Zone Management
Council on Environmental Quality

Robert L. Herbst
Assistant Secretary for Fish and Wildlife and Parks

67-601 O—80——3

COVER SHEET

ALTERNATIVE POLICIES FOR PROTECTING BARRIER ISLANDS ALONG THE ATLANTIC AND GULF COASTS OF THE UNITED STATES
AND
DRAFT ENVIRONMENTAL STATEMENT

- Council on Environmental Quality
- Department of Commerce - Office of Coastal Zone Management
- Department of the Interior

Heritage Conservation and Recreation Service (Lead agency)

National Park Service

Fish and Wildlife Service

December 1979

Abstract: This statement is in response to a directive contained in the President's 1977 Environmental Protection Message. It examines Federal programs which, through grants, loans, subsidies, permits, or acquisition and management, contribute to the development or protection of barrier islands, beaches, and spits which lie adjacent to the Atlantic and Gulf Coasts of the United States. Further, it examines alternative changes to those programs which would enhance the opportunities for protecting the islands and discusses consequences of each of the alternatives.

For further information: Director, Heritage Conservation and Recreation Service, Department of the Interior, Pension Building, 440 G Street NW, Washington, D.C. 20243; Attention: Deputy Director.

BARRIER ISLAND PROTECTION PLAN--DRAFT ENVIRONMENTAL IMPACT STATEMENT

Summary

In his May 1977 Environmental Message, President Carter directed the Secretary of the Interior, in consultation with the Secretary of Commerce, the Council on Environmental Quality, and State and local officials of coastal areas, to develop an effective plan for protecting Atlantic and Gulf Coast barrier islands, including recommendations for action. This DEIS is the result of that directive.

The barrier islands included in this study extend from Maine to Texas. Each is an elongated, narrow landform separated from the mainland by marshes or open water intimately related to the island. They range in size from less than 50 acres to well over 100,000 acres and are equally varied in shape and profile.

The estuaries and sounds that barrier islands protect are among the richest and most productive ecosystems known. In addition to providing spawning and nursery grounds for a wide variety of fin and shellfish, they also provide nesting and feeding grounds for numerous birds and other mammals.

The islands are made up of unconsolidated and shifting sands. The continually changing relationship between the ocean floor, surf line and moving sediment, produces islands that are, for the most part, structurally and locationally unstable.

Nearly 300 study units were identified in the course of the study leading up to this statement and about 50 bits of information on each incorporated into a computerized program. A study unit may consist of a single island, part of an island, or a group of islands; sand spit; barrier beach; or mangrove island.

The 300 units total about 1.6 million acres. Of these, approximately 621,000 acres are managed by Federal, State, or local government agencies and 986,000 are under private ownership. Over 243,000 acres are considered to be developed while 625,000 are protected from future development. The remaining 739,000 acres are undeveloped but are not protected from future development.

In terms of land use or land cover, the greatest amount of area (about one-half) is wetland; nearly equal amounts are urbanized or barren (slightly less than 229,000 acres each). However, the data show that between 1950 and 1973-4, slightly more than 137,000 acres were added to the urbanized column, while nearly that many were removed from the wetland column.

Permanent human habitation of many of these islands is hazardous for a number of reasons. First, sea level is slowly but steadily rising, averaging about one foot per century along the mid-Atlantic coast. Secondly, the unconsolidated sand routinely moves about while the works of man require stability. Erosion, or migration, rates are high. Lands now considered safe for building may be extremely hazardous or may simply disappear within a few years. Thirdly, the islands are vulnerable to hurricanes and other storms. Storm waves breach and overwash the dunes and entire sections of an island can be inundated or severely eroded.

The unique character of each island, combined with the national interest in protection of barrier islands in general, represents a special opportunity for cooperation between Federal and State governments in formulating future barrier island policy.

Several significant conclusions were developed from the research conducted and data collected for this statement. These are:

1. Barrier islands need special recognition.

   --Barrier islands are unique, discrete components of the coastal zone meriting special action and attention. The dynamic and fragile character of barrier islands often has not been recognized by the governmental jurisdictions whose programs affect them.

   --The responsibility for the development of a consistent Federal policy related to barrier islands is unfocused and uncoordinated. As a result, Federal programs have unanticipated and conflicting impacts on them.

2. Review of existing Federal authorities related to barrier islands reveals the need for a clear Federal barrier island policy.

   --Federal authorities exist which could positively address aspects of barrier island protection; however, they do not relate specifically to barrier islands. They include: the Coastal Zone Management Act of 1972 (as amended, 1976), the Floodplains Management Executive Order 11988 and Wetlands Protection Executive Order 11990, the National Flood Insurance Program, the Flood Disaster Protection Act, and the Fish and Wildlife Coordination Act. Properly implemented and enforced, these programs have the potential to promote the wise use of barrier islands. However, new legislative initiatives specifically directed towards barrier island preservation will be required to achieve the highest levels of protection.

3. Information on which to base the formulation of barrier island policy needs to be made available to planners and other public and private officials.

   --Federal, State and local growth management decisions concerning barrier islands often have been based on insufficient impact analysis.

   --The information necessary and appropriate for barrier island resource management planning is just beginning to become widely available. The dissemination of this information to the range of decisionmakers in need of it has not been widespread.

4. Private enterprise needs to continue to play a valuable role in barrier island protection.

   --Private conservation groups have taken a lead in monitoring Federal, State and local barrier island related activities and in the drive for an evaluation of Federal barrier island related policies. Some also have acquired significant portions or numbers of barrier islands for preservation purposes.

5. The roles of the States and localities are critical to any program to protect barrier islands. They are key to the success or failure of any barrier island protection effort.

   --States and local units of government have the first opportunity to protect their barrier islands and/or provide for their orderly development. States and their subdivisions have the tools by virtue of the authorities and roles granted them by the U.S. Constitution and as a result of various Federal programs and through land development controls traditionally exercised by local governments.

   --The decisions made by the States and localities will be affected by the extent to which Federal programs can be redirected, implemented, and enforced; the "trickle-down" effect of the redirected Federal programs; and, the increasing public awareness of barrier island dynamics and values as storm buffers, fish and wildlife habitat, and public recreation sites.

The research and data from which these conclusions were derived represent a substantial effort on the part of the Fish and Wildlife Service, National Park Service, Office of Coastal Zone Management, and the States. These organizations provided specific information to update and supplement data gathered by HCRS (formerly BOR) for its more generalized study, Islands of America (1970). HCRS then put these data into a computerized program for easy retrieval and future up-dating.

The data gathered for this statement, for the most part, were island specific and were the basis for the various alternatives and options for barrier island protection which have been developed. However, rather than addressing specific problems or opportunities of actions on a particular island, the alternatives and options presented and discussed in this statement are directed at Federal agencies and authorities that in one way or another impact on barrier islands. In other words, they are program, rather than resource, specific.

Federal programs and authorities have, in many ways, encouraged development of barrier islands, resulting in potential problems of public health and safety, increasing costs, and loss of important public benefits provided by unspoiled barrier islands.

This situation is not the result of any directed Federal policy to encourage barrier island development. Rather, it results from a general lack of knowledge and understanding of barrier islands as unique resources warranting special attention and a lack of appreciation of the need for protection. While a broad range of Federal and State authorities address aspects of barrier island land management, barrier islands as a whole are treated only as a peripheral concern. Thus, the development on many barrier islands is the product of inadequate planning policy.

Although accomplishments under national environmental policies are noteworthy, there still is room for improvement, particularly with regard to barrier islands. Several programs exist which can be redirected to help protect, maintain, and enhance the unique resources of barrier islands. New legislation, or amendments to existing authorities, is necessary, however, to attain the highest level of barrier island protection. The success of any endeavor depends greatly on the guidelines, objectives, programs and policies which agencies develop and the effort and determination they commit to the implementation and enforcement of those programs and policies.

The thrust of the alternatives and options is to identify means by which the development oriented programs can be modified to affect conservation rather than unwise development of these narrow and valuable landscapes.

Each of the options by itself will provide a measure of protection to barrier islands. Obviously, some will be more far reaching than others; some will provide stricter protection than others; some will be more or less costly to implement than others; and, some will be more or less popular with the agency responsible for enforcement and the affected public than others. Some are simply different degrees of the same basic option.

By presenting different levels of effort, the options or actions necessary to achieve those levels, and the impacts of various alternatives, this draft environmental impact statement offers decisionmakers the opportunity to determine the level of commitment and expenditure of energy they believe feasible. The options consciously emphasize Federal programs and responsibilities but also give recognition to the significant role played by State and local governments in determining whether barrier islands are protected or developed.

Three alternative levels of effort are presented—low, moderate, and high. The low level alternative describes existing Federal programs which already are working to protect barrier islands from unwise development and those which are being redirected or are evolving away from a development oriented posture toward protection of barrier islands. This essentially is a description of the status quo - no options for change are presented.

The moderate level builds on the low level by describing existing authorities which could contribute to barrier island protection but which, because of a lack of direction, delegation, or appropriation, are not moving as effectively as they could toward barrier island protection. The options presented are designed to make these authorized programs more effective in protecting barrier islands.

The high level options are new program thrusts. New and amendatory legislation will be required as well as strong executive directives.

It should be noted that these preliminary options are not recommendations and do not constitute administration position on any of the issues or programs identified. The options address a wide range of activities and, consequently, may be further refined before final recommendations are developed.

The Affected Environment chapter contains, among other pertinent information, a description of barrier islands, the processes that created them, and the dynamics that make them an ephemeral and fragile land form.

In addition to the description of the physical environment, socio-economic information primarily related to the 18 Atlantic and Gulf coast States and 108 coastal counties which contain the barrier island study units is provided as well. Although the socio-economic situation on the islands may tend to be substantially different than in the larger geographic areas for which specific data are available, a description of the States and counties does provide some insight about the surrounding areas.

The counties in which the barrier island study units are located present a varied profile. Population is growing rapidly, primarily as a result of in-migration. Recreation and tourism, not surprisingly, play a major role in the economy of these coastal counties. Tied closely to recreation and tourism is the availability of transportation facilities to the coast and to the islands themselves. Of the 300 study units, 175 have direct vehicular access by road, bridge, or causeway; nine have airports; and, 24 are accessible by regular ferry boat service.

Cultural resources of significance abound on the barrier islands. Although no complete and coordinated survey or inventory has been conducted of the sites on barrier islands, 76 sites listed on the National Register of Historic Places and 73 sites listed as National Natural Landmarks have been identified on the study units.

The barrier islands also were found to contain valuable habitat for numerous species of plants and animals, many of which are listed as endangered or threatened.

The belief that Federal programs are encouraging and assisting development of barrier islands with resulting losses of natural, cultural, fish and wildlife, and recreational values is well founded. Programs of nearly 20 Federal agencies were identified as having an impact on barrier islands. Although about one-fourth of the agencies administer programs which directly or indirectly provide protection for barrier islands, over one-half administer grant, loan, permit, or construction programs that have had adverse impacts on the study units; the remainder administer property, insurance, and relief programs that have encouraged or perpetuated unwise use of the islands. These programs are described in detail in Appendix "A".

Over three fiscal years, the permitting, granting, and licensing agencies committed nearly one-half billion dollars to barrier island development projects.

The Environmental Protection Agency contributed the largest share of these funds in the form of grants for waste water treatment facilities. The Economic Development Administration, Farmers Home Administration, and others also provided grants for waste water treatment. The Corps of Engineers invested heavily in beach restoration and protection projects. Home and business mortgage insurance programs also supported heavy investment in barrier island development.

Some agencies do not administer lands or provide loans or grants for projects on barrier islands but, through permit programs or regulations, have a profound effect on them. One such agency is the U.S. Coast Guard which has responsibility for issuing permits for bridges across navigable waters. A bridge frequently is the first and most essential item required for development of a barrier island. Another such agency is the Federal Emergency Management Agency which administers both the Flood Insurance Program and the Federal Disaster Relief Program. These programs appear, in many situations, to provide the impetus for developing (or redeveloping) barrier islands.

Over 620,000 acres of the 1.6 million are held by public agencies whose primary barrier island mission is protection of natural values and/or provision of recreation opportunities. These conservation minded agencies are making some progress in acquiring critical areas on the barrier islands. In the past 10 years, the Fish and Wildlife Service alone has acquired all or major portions of 13 barrier islands involving nearly 50 miles of beach. The Service has plans to acquire more in the near future. The National Park Service, too, has acquired substantial barrier island acreage; has prepared comprehensive management plans for its units; and has adopted a policy for preserving the natural processes on barrier islands. Both agencies are studying their units for possible additions to the Wilderness System.

State and local governments, too, are acquiring barrier islands for recreation, fish, and wildlife purposes. With assistance from the Land and Water Conservation Fund, at least 112 projects costing over $100 million have been undertaken on barrier islands. These projects are located on 74 islands in 17 of the 18 States. The Office of Coastal Zone Management also assists the States in designating and acquiring estuarine sanctuaries. Although this latter program has, as yet, not been extremely successful, it has great potential for protecting barrier islands.

In spite of these significant accomplishments and high potential for accomplishing even more, it has not been enough.

A long, uncharacteristic period of low storm activity (especially hurricanes along the southeast Atlantic Coast) has caused tremendous demands to be placed on the islands for development of primary and secondary home sites and recreation resort areas. As a consequence, the barrier islands are urbanizing at a rate twice that of the Nation as a whole. The result is that 14% of the island space is considered urban while only 3% of the mainland area is urban.

This unprecedented growth creates severe problems in terms of the numbers of people and the amount of personal property in a hazardous location. Development of adequate means of escape during storm threats has not kept pace with development on the islands. Nearly 80% of the people now living in island cities and communities have never experienced a hurricane. Even if they heed and take seriously a hurricane warning, it is doubtful that more than a relatively minor percentage could escape before the storm hits. Property values, too, have increased tremendously over the past two decades. Damage from a major hurricane or nor'easter in areas such as Galveston, the Florida and Northeast coasts would be astronomical. Costs for disaster relief would be borne not only by the island residents, but by all of the Nation's taxpayers.

The alternatives and options presented in this statement will afford decisionmakers an opportunity to weigh the advantages and disadvantages of various types and levels of possible actions to protect barrier islands.

To be sure, there will be controversies. People already live on barrier islands and substantial economic investments have been made. For many of the investors and inhabitants, Federal protection and subsidy have become a way of life. Many of the alternatives and options are designed to get the Federal Government out of the business of developing, or encouraging development of, barrier islands. As such, they would dramatically change the way of life to which many people on barrier islands have become accustomed.

However, the time for action is now--before the next big storm. Afterwards, it would be virtually impossible to resist repeating past mistakes in the face of human suffering and loss.

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Purpose and the Need for Action

In the May 1977 Environmental Message, President Carter said:

> "Coastal barrier islands are a fragile buffer between the wetlands and the sea. The 189 barrier islands on the Atlantic and Gulf Coasts are an integral part of an ecosystem which helps protect inland areas from flood waves and hurricanes. Many of them are unstable and not suited for development, yet in the past the Federal Government has subsidized and insured new construction on them. Eventually, we can expect heavy economic losses from this shortsighted policy.
>
> About 68 coastal barrier islands are still unspoiled. Because I believe these remaining natural islands should be protected from unwise development, I am directing the Secretary of the Interior, in consultation with the Secretary of Commerce, the Council on Environmental Quality, and State and local officials of coastal areas, to develop an effective plan for protecting the islands.
>
> This report should include recommendations for action to achieve this purpose."

The purpose of this Statement is to respond to the President's directive by providing a number of options, according to specific levels of protection, which would allow decisionmakers to determine the most desirable and feasible plan of action for barrier island protection.

In an information supplement issued following his May 1977 Environmental Protection Message, the President said:

> "Most of the barrier islands are . . . targets of intense real estate and development activity. The development of these resources has often been encouraged by federally permitted or subsidized roads, bridges, and sewers, with the result that millions of people have been subjected to the hazards of hurricanes, and to property losses from the erosion and other physical changes that are characteristic to barrier formations. These hazards and losses have, in turn, invited substantial Federal spending for seawalls . . and beach restoration projects that perpetuate more settlement and then more Federal investment, while causing the continuous loss of valuable and unique resources."

Permanent human habitation of the islands is hazardous, if for no other reason than overwash and erosion. Unconsolidated sand routinely moves about while roads and houses cannot. Yet, a large number of people inhabit barrier islands and many others continue to seek living space on them. Public demands for new facilities and developments as well as increased access and use are occurring on the Atlantic and Gulf Coast barrier islands. Between 1950 and 1973, urban acreage of barrier islands increased by nearly 138,000 acres;

forty islands which had no urban acreage in 1950 had land categorized as urban in 1973; approximately 14% of the total barrier island acreage is urbanized as compared to 3% for the Nation as a whole; the rate at which barrier islands are urbanizing is about twice that of the Nation as a whole. Even on those heavily developed islands where further expansion of urbanized areas is not possible, assessed valuation of developments has increased tremendously.

As these trends continue and intensify, further loss of the natural attractions and inherent values on barrier islands, as well as further development in high hazard areas, is imminent. Likewise, increased governmental expenditures to subsidize developments, to protect lives and investments, and to rebuild storm-damaged facilities are probable.

The responsibility for the development of a consistent Federal policy related to barrier islands has been unfocused and uncoordinated. This has resulted in many Federal program actions with unanticipated and conflicting impacts on barrier islands. About 20 different Federal agencies administer approximately 30 programs that either do, or have the capability to, impact barrier islands. During the past three fiscal years, development oriented agencies have committed nearly a half billion dollars to barrier island development projects.

Insufficient coordination among Federal agencies is a major problem in barrier island protection. On one hand, there are Federal programs and policies that tend to encourage development that is incompatible with natural processes and values of barrier islands and beaches. On the other, there are Federal programs and policies designed to promote the conservation of barrier islands and their resources. These programs often work at cross purposes, resulting in potential problems of public health and safety, loss of important public benefits provided by unspoiled barrier islands, increasing costs, and wasted dollars.

This situation is not the result of any directed Federal policy to encourage barrier island development; it results from a general lack of knowledge and understanding of barrier islands as unique resources warranting special attention. Federal, State, and local growth management decisions concerning barrier islands often have been based on insufficient impact analysis and resource descriptive information. Information concerning the dynamics and values of barrier islands, necessary and appropriate for barrier island resource management planning, is just beginning to become widely available. Because interest in the scientific aspects of barrier island dynamics is relatively recent, the findings generally have been circulated only among members of the scientific community. The dissemination of this information to decisionmakers in need of it has not been widespread.

Thus, the need for action becomes quite obvious. The hazards and expense of barrier island development and habitation must be realized as well as the serious impacts that unwise programs are having on the environment. By identifying and isolating existing Federal programs which are both beneficial and detrimental to barrier island protection, this Statement analyzes a broad action proposal which can be used as the basis from which more specific action proposals can be developed. It provides decisionmakers with strategies and a comprehensive source of information they will need in their attempt to solve barrier island conflicts in keeping with the President's directive.

Chronology and Consultation to Date

Following the May 1977 Environmental Message, the Secretary of the Interior established a study group to prepare a report on barrier island issues and to determine an action plan to protect barrier islands. The study group consisted or representatives primarily from HCRS, NPS, FWS, OCZM, and CEQ and held its first meeting on June 30,1977. The work group was to encompass all barrier islands in the report; developed, as well as those relatively unspoiled. Once identified, barrier island study units were described according to the level of protection afforded by current owners, current land use, and other natural resource features.

In September 1977, letters were sent to DHUD, DOD, EPA, DOT, DOA, GSA, the American Wildlife Federation, Nature Conservancy, the Environmental Defense Fund, and the governors of the eighteen coastal States inviting representatives to form an Advisory Committee to provide information on agency programs affecting barrier islands and to act as a sounding board for policy options. During October 1977 personal contact was made with each Federal Agency on the Advisory Committee.

A barrier island conference was conducted on December 12 and 13, 1977, in Savannah, Georgia. The Conference served as public information meeting to address barrier island natural processes and policy options for their protection, to recognize the State's role in barrier island protection, and to present barrier island study concepts. As a result of the conference, a number of issues and recommendations were surfaced with respect to protecting barrier islands.

The first draft of the study report was competed in June 1978. It was reviewed, revised and released to the public in July 1978. The study consisted of a description of the barrier island problem; the impacts of development on government agencies and the private sector to protect the islands. The study did not include recommendations or an action proposal specifically directed to protecting barrier islands. When the document was made available for review, comments were received from ten States and a number of Federal and private agencies.

On October 2, 1978, a decision was made to prepare a draft EIS in order to present an array of options dealing with Federal programs to protect barrier islands. The barrier island work group was reconvened and strategies discussed to complete the DEIS in such a way as to further promote the protection of barrier islands.

During February 1979, a draft EIS was circulated for comment within the Department of the Interior. On February 26, 1979, Department of the Interior, DHUD, FIA, and FDAA representatives met to review respective programs and agency responsibilities to protect the barrier islands.

A one-day workshop was held on March 15, 1979, with Federal and State officials to project a multi-level strategy to build support for the confidence in the barrier island DEIS process. The following individuals from outside the Department of the Interior participated in this effort.

Mr. Hans Neuhauser, The Georgia Conservancy, Inc.
Mr. Steve Frishman, Texas Coastal Marine Council
Ms. Lesli Rice, Natural Resources Defense Council
Mr. Carney Moran, FDAA
Mr. Dick Gardner, OCZM
Mr. Truman Goins, DHUD

An action proposal resulting from the workshop stressed the need for accuracy with respect to the various Federal programs discussed in the DEIS. Consequently, letters were sent to all appropriate Federal offices seeking comments on their program responsibilities as described within the DEIS. Follow-up meetings were conducted with OCZM to obtain accurate program descriptions for the DEIS.

As a result of the above mentioned efforts and the input, as provided from a variety of sources, the DEIS was completed in December 1979.

Future Actions

This DEIS does not adhere to the exact standards for environmental impact statements. It does not provide a preferred alternative nor does it include a comprehensive environmental impact analysis due to the unique array of options which are presented in the Alternatives Section. What this document does do, however, is present a wide range of options which could be utilized to protect barrier islands. Obviously, some options may be quite difficult to implement; others may have only a minimal effect on protecting barrier islands; while others may not be feasible at all at this time. This review process, nonetheless, will enable governmental agencies, the private sector, and the general public to screen the options, cull those options considered non-feasible, and focus on those considered most effective and feasible.

Specifically, The Secretary of the Interior and the Secretary of Commerce will use the review process in preparing their recommendations on how best to protect coastal barrier islands. Their recommendations will describe how Federal programs already working to protect the island's integrity can be improved. Further changes in Federal activities to meet the President's objective of preventing unwise development on our barrier islands also will be presented.

Special commitments will be made by the Secretaries of Interior and Commerce to change programs for which they have authority to better protect the islands and to seek changes in other program areas for which new authority is needed.

Those options receiving favorable response will be further addressed in the final EIS. Those same options will be reviewed further by all agencies in order to determine agency commitment and to implement and enforce specific programs resulting from the selected options. On the basis of the agency response, a proposed action program for protecting barrier islands will be presented in the final EIS and forwarded to the President for his review and recommendation.

Officials, by agency, who participated in the development or review or who offered comments and data for the barrier island study and the DEIS include:

Corps of Engineers	Mr. John Housley Mr. Richard Makinen Lt. Col. John Hill
Environmental Protection Agency	Mr. Larry McBennett
Department of Agriculture	Mr. Dan Ball Mr. James F. Thornton
Small Business Administration	Ms. Maxine Wood
Department of Transportation USCG	Mr. Robert Thurber Cpt. Richard Hodges
Department of Energy	Mr. Robert Catlin
Council on Environmental Quality	Mr. Malcom Baldwin Mr. Robert Kutler
Federal Insurance Administration	Mr. Ken Garvey
Federal Disaster Assistance Administration	Mr. Carney Moran Mr. Ugo Morrelli
Federal Energy Regulatory Commission	Mr. George Taylor
General Services Administration	Mr. Jim Buckley Mr. Jim Kearns Mr. Carl Penland
Department of Housing and Urban Development	Ms. Margaret Pepin-Donat
Department of Interior Bureau of Land Management	Mr. David Lodzinski

National Park Service	Dr. William Gregg
Fish and Wildlife Service	Mr. Robert Peoples
Department of Commerce	
OCZM	Mr. Jim McFarland
	Ms. Carol Sondheimer
	Mr. Richard Gardner
EDA	Ms. Diana Wall
University of Georgia	Mr. Eugene Odum
Natural Resources Defense Council	Mr. Larry Rockefeller
University of Massachusetts	Dr. Paul Godfrey
	Ms. Melinda Godfrey
	Dr. Steve Leatherman
Texas Coastal and Marine Council	Mr. Joe Moseley

I. ALTERNATIVE POLICIES

ALTERNATIVES FOR ACTION

The Nation is becoming increasingly concerned with the protection of its coastal resources. Recent congressional and presidential actions have begun to address this concern with laws and executive orders which affect numerous Federal and State agencies' programs. As a result, many diverse capabilities can be brought to bear on the need to focus on and expand the role of protection and enhancement of the coastal environment for the future of the Nation.

Although the establishment of many national environmental policies is noteworthy, a clear need remains to provide for the protection of barrier islands. This chapter presents three alternative levels of effort, each with an array of options, for protecting barrier islands.

The options presented are Federal program, rather than island resource, specific and are designed to guide Federal decisionmakers in making their programs more effective in protecting barrier islands. While the options relate exclusively to Federal programs, policies, and authorities, implementation of many of them will influence and set the tone for related State and local actions.

The three levels, low (current efforts), moderate (redirection of authorized programs), and high (legislation and executive directives), afford flexibility to decisionmakers as they evaluate each option according to its ability to protect barrier islands. In addition, identifying the options by level of protection clearly presents a number of possible ways the Federal programs within each level could be utilized to protect barrier islands. A preferred alternative is not presented in this draft environmental impact statement for the following reasons: (1) the President directed the development of "an effective plan for protecting the islands." The purpose of arraying options by alternative levels of protection is to allow decisionmakers to determine the level of protection most feasible; (2) each barrier island is a dynamic and interdependent part of a resource system. The level of protective effort determined to be most feasible must, therefore, consider the islands as a continuum and not as independent, disconnected pieces of real estate; and (3) the options involve the programs of about 20 different Federal bureaus and agencies. To be effective, each option would require a solid commitment by the responsible agency to enforce or administer the program requirements necessary to protect barrier islands. Before a practical preferred alternative can be developed, each agency must be given an opportunity to carefully review the various options affecting their areas of responsibility.

The options recognize many Federal programs which already provide some protection. They also include programs which have protection potential but all too often do not specifically identify the need for, nor the value of, protecting barrier islands.

The low level protection alternative offers nothing new; it does identify what is ongoing in terms of trends and existing Federal programs. It would, however, increase the level of awareness of barrier island problems and the need to protect these coastal environments. At a minimum, this would have a beneficial effect on the work of the various agencies and officials responsible for administering existing programs. The low level alternative briefly discusses those programs identified as having significant impacts on barrier islands. These same programs are described in greater detail in Appendix A. This alternative is the no-action alternative required to be discussed in an EIS, and, as such, is valuable for understanding the nature and extent of present Federal involvement on barrier islands. However, the President directed the development of a Federal plan for action, and this is what is presented under the moderate and high levels of protection.

The moderate and high level protection options are organized differently than the low level section. Whereas the low level discussion is organized according to the Federal agency involved, the moderate and high level options are grouped by eight major types of Federal actions identified as requiring modifications in program administration or emphasis. An option is not presented under the moderate or the high levels on the basis of the degree of protection it would afford, but instead is grouped under the moderate level when it would appear that it could be implemented under existing legislative authorities, and under the high level whenever it would appear that new legislation would be necessary.

The moderate level protection alternative offers many opportunities to make existing program authorities more effective in protecting barrier islands. They identify numerous Federal authorities and responsibilities which, because of certain constraints, have not been fully implemented. By merely emphasizing the need for certain existing programs to be more fully and sensitively implemented by the responsible agency, barrier islands would receive more protection. Of major importance in the moderate level alternative is the need to specifically direct or redirect these full implementation efforts by giving high priority to barrier island resources.

This is particularly true for Federal grant and loan programs whose purpose it is to stimulate development or to aid disaster recovery. While these programs are of undeniable benefit in most other areas of the country, they must be carefully evaluated before being applied on barrier islands. Existing environmental review procedures such as the National Environmental Policy Act and the Executive Orders on floodplain management and protection of wetlands need to be applied strictly in regards to barrier island proposals, as do all development project approval procedures. Restricting all development on barrier islands is infeasible and probably undesirable, but the identified national programs must be capable of giving barrier island dynamics and restrictions their due weight.

The high level protection alternatives recommend new measures to be developed, established, and adopted to assure barrier island protection over an indefinite time period. In most instances new legislation will be required to achieve the high level options for protecting barrier islands. This is because, in contrast to the moderate level options, either existing laws cannot be sufficiently directed to provide the requisite protection, or because new legislative direction was deemed necessary to complete the framework for barrier island protection. There are fewer options presented in the high level alternative because it was determined that full application of the moderate level recommendations would achieve substantial barrier island protection, and because new legislative proposals traditionally emanate from Congress. It is anticipated that the problems associated with developing barrier islands will result in more legislative proposals being developed than those presented here, and that this plan adequately documents any problem under existing authorities. Hence, most legislative recommendations are simply amendments to present laws.

The draft EIS does not represent the final plan for the President, because it is anticipated that after Federal agencies and the public review the information presented in this document regarding the agency programs and their impact on barrier islands, their comments will help shape the final product.

Again, it is important to iterate that these options do not represent administration policy; they simply discuss methods which may be means of achieving the President's goal of protecting barrier islands from unwise development. The options are not recommendations at this time and are subject to further refinement.

Low-level Protection Alternative

This section is not a call to action. No specific proposals for change are made. The section describes the current status of activities; indicates that some changes in program direction are taking place; and establishes a base for subsequent alternatives that will require specific action to be taken.

Some of the changes that are occurring are the result of a recognition of barrier island values and dynamics and conscious decisons to administratively redirect program activities toward a wiser use of barrier islands. Others are the result of exogenous influences, such as the executive orders on floodplain management and protection of wetlands, which require administrators to examine their programs and to be in conformance with the intent of those orders. But the President was not satisfied with simply waiting for the natural evolution of existing programs to become sufficiently sensitized to the hazards of barrier island development; instead a plan of action was called for and is presented with a variable mix of options under the moderate and high levels.

Program Areas

Programs administered by Department of the Interior bureaus, perhaps more than those of any other Federal department or other level of government, have directly and indirectly provided for the protection of barrier islands or have heightened the public awareness of the public benefits of providing that protection. A brief description of these program activities follows.

Heritage Conservation and Recreation Service

Land and Water Conservation Fund (LWCF)

The Land and Water Conservation Fund Act of 1965, P.L. 88-578, as amended, established a fund to increase outdoor recreation opportunities for the American people. The Fund is administered by the Heritage Conservation and Recreation Service (HCRS).

The program provides for (1) acquisition of lands for federally-administered parks, wildlife refuges, and recreation areas (the "Federal side"), and (2) matching grants for State recreation planning and State and local land acquisition and development (the "State side").

In order to receive grants from the Fund, a State must develop a Statewide Comprehensive Outdoor Recreation Plan (SCORP), and update and refine it on a continuing basis. The Fund provides matching planning grants and technical assistance to States to help develop and update comprehensive outdoor recreation plans.

HCRS figures show that during the 13 years of program operation, Federal agencies have spent over $128 million in LWCF monies to acquire barrier island acreage.

The National Park Service (NPS) and the Fish and Wildlife Service (FWS) are the two DOI agencies which are eligible to use the Land and Water Conservation Fund for acquisition of barrier islands.

Although the National Park Service currenty administers more barrier island acreage than the FWS, the FWS administers 2 ½ times more units and maintains a more active acquisition program. The NPS has identified three barrier island areas which merit detailed study by the the NPS to determine the most effective way to protect them. The FWS, on the other hand, expects to begin acquisition of at least two more barrier islands in the next two years. In addition, the Service has identified 51 other barrier islands which are suitable for inclusion in the National Wildlife Refuge System and which may be acquired if there is no other way of protecting them.

State and local agencies have received more than $51 million in matching grants to acquire acreage and develop projects located on barrier islands. The States and localities used the Fund money for 112 projects of which about 50 were for acquisition. Florida has the most ambitious acquisition program on barrier islands with Fund assistance. The State of South Carolina requested and received Fund assistance for development of a barrier island related planning component of its SCORP. Thus far, it is the only State to do so.

Natural Landmarks and National Register Sites programs also are administered by HCRS.

Any Federal agency that intends to carry out, fund, license, or permit a project that would adversely affect a landmark would be required to circulate an EIS describing the probable impacts, means of mitigation, and the feasible alternatives to the proposed project. An EIS would be required in accordance with the general provisions of Section 102(2)(c) of the National Environmental Policy Act.

A similar form of protection is extended to any item on the National Register, but in this case it is done so by the explicit mandate of Section 106 in the National Historic Preservation Act of 1966, as amended, (P.L. 89-665). Any Federal agency, prior to its funding, licensing, or approval of a project must consider the project's effect on sites included or eligible for inclusion on the Register, and must provide the Advisory Council on Historic Preservation with the opportunity to comment on the undertaking.

Seventy-three sites on 68 barrier island units have been identified under the National Natural Landmarks Program. Of these, 17 have been designated officially by the Secretary of the Interior as National Landmarks.

The National Register of Historic Places lists 76 barrier island properties, three of which have been designated by the Secretary as National Historic Landmarks. (See appendix for a complete listing).

The Historic Preservation Fund, administered under the authority of the National Historic Preservation Act of 1966, makes matching grants for historic preservation to the States from an annual appropriation for that purpose. The States may use the grants for surveying, evaluating, acquiring, and preserving significant cultural resources.

Since the program was first funded in 1970, over $46,625,000 have been granted to the 18 barrier island States through FY 1978. Considerably less than 1% of this amount is estimated to have been used to promote resource preservation on barrier islands.

National Park Service

The National Park Service's primary responsibilities in protecting barrier islands are associated with its stewardship of nine national seashores, one national recreation area, one national monument, and part of one national park. These units of the National Park System are administered to ensure long-term protection and preservation of natural and cultural resources and to provide recreational opportunities consistent with preservation of the natural values.

The recreational use of the National Park Service units reflects three significant factors. One is proximity to urban centers; Gateway National Recreation Area and Cape Cod are primary examples. The second factor is accessibility; those islands that are more remote or lack bridge access (Cape Lookout, Cumberland Island) draw fewer visitors. The third factor is public familiarity. The earlier established seashores or those receiving public attention show steady visitation growth.

Except for Wright Brothers National Monument (on Bodie Island, North Carolina), which was established by Presidential Proclamation in 1927, the remaining 11 units were authorized by separate acts of Congress. These acts set forth the specific purpose of each unit as well as constraints and obligations in its administration.

The National Park Service has undertaken and sponsored a multi-faceted program of research which continually expands the understanding of the barrier island environment and the unique constraints the environment places on development and use. With respect to barrier islands administered by the National Park Service, the research findings have demonstrated the inability of these areas to support the amount of permanent development and public use typically envisioned at the time the units were legislatively authorized. Management objectives are continually being revised to point future use of the barrier island units in the direction of less permanent development, less manipulation of natural processes, and increased opportunities for less intensive public use related to appreciation of the natural environment. Management plans for the barrier island units reflect a generally conservative approach to development and public use that is born of an awareness of the fragility and vulnerability of these resources and the dynamic nature of the forces acting upon them. The only exception is Gateway National Recreation Area, where the provision of intensive structured recreation is a major objective.

Until recently, the national seashores were managed under the National Park Service's guidelines for recreation areas, as opposed to natural areas and historic areas. This promoted the construction of roads, utilities, visitor centers, campgrounds, and other facilities. Like other owners of barrier island property, NPS took measures to protect its investment against the islands' natural proclivity to move around. However, after nearly three decades of unsuccessful attempts to stabilize the dunes at Cape Hatteras, as well as less ambitious efforts elsewhere, the National Park Service recognized the ultimate futility of human efforts to arrest the forces of nature on dynamic barrier island systems.

The newly-approved "Management Policy for Shoreline Processes" states that, as far as possible, and cognizant of NPS responsibilities that accrue from its previous policy and actions, there will be no further attempts to restrain the natural processes of erosion, deposition, dune formation, and inlet formation. The policy further states that:

> "In development zones, management should plan to phase out, systematically relocate, or provide alternative developments to facilities located in hazardous areas. New facilities will not be placed in areas subject to flood or wave erosion hazard unless it can be demonstrated that they are essential to meet the park's purpose, that no alternative locations are available, and that the facilities will be reasonably assured of surviving during their planned lifespans without the need of shoreline control measures."

This new policy for barrier island land management will be implemented on a seashore-by-seashore basis, and will be accomplished through each unit's general management plan. The specific application of the policy can be seen in the example of Fire Island National Seashore, where the following proposed actions demonstrate the application of the policy in a specific management unit:

- The NPS will attempt to restore the island's natural sand movement.
- A Sand bypass system will be developed to maintain a more natural littoral drift system on the Seashore.
- Sand nourishment of beaches on the Seashore will be conditional upon implementation by the Corps of Engineers of sand bypass systems at the inlets.
- No inlets will be opened artificially.
- There will be no beach stabilization structures.
- All pedestrian dune crossings will be on elevated boardwalks and vehicular dune crossings limited to those essential for access and management.
- There will be no anti-mosquito ditching in the marshes.

Public Law 94-458, the NPS Administrative Authorities Act, directs the Secretary of the Interior "to investigate, study, and continually monitor the welfare of areas whose resources exhibit qualities of national significance and which may have potential for inclusion in the National Park System, and annually to submit a listing of not less than 12 such areas to the Speaker of the House and President of the Senate." This authority presents the NPS with an opportunity to identify high priority barrier islands for inclusion in the National Park System.

Nine of the 12 barrier island units contain varying amounts of privately owned or non-Federal publicly owned acreage. These amounts range from over 35,500 acres of non-Federal public lands at Gulf Islands National Seashore to less than 100 acres at Padre Island National Seashore. The total acreage involved (12-31-76) is nearly 147,000 acres or about 21% of the amount within the authorized boundaries of the 12 units.

It should be noted that, although privately owned lands comprise only about 4% of the total authorized acreage in the barrier island units, they make up about 11% of their fast land acreage, with individual unit percentages ranging from 0% in several units to 31% at Gulf Islands.

It is established Service policy to prepare a land acquisition plan for each unit and to acquire lands as needed to achieve the management objectives of the unit in a manner consistent with legislation, executive direction, and the plan. A land acquisition strategy will be developed on a unit-by-unit basis.

All of the enabling acts which allow the use of public funds for land acquisition in barrier island units also allow the owners of private property to exercise a right of use and occupancy. Use and occupancy agreements normally run for the duration of the owner's life or for a fixed time period, usually 25 years.

The increase in the Federal investment in and ownership of NPS-administered barrier islands has been substantial in recent years. Utilizing data from 9 barrier island units since 1961, total Federal investment has risen from $4.3 million to $143.8 million--a 33-fold increase. The inventory of NPS-administered fast lands on barrier islands has risen from about 19,000 acres to almost 222,000 acres--nearly a 15-fold increase. During the same period, the Service's inventory of structures on barrier islands increased from about 52,000 square feet of floor space to nearly 1.4 million square feet--an almost 27-fold increase, in large part due to the substantial number of structures transferred to the Service from the City of New York at Gateway National Recreation Area. The disposition of these structures poses continuing management problems on barrier islands where the Service is committed to reducing the level of development to the absolute minimum necessary to achieve park management objectives.

The National Park Service also is responsible for designating suitable sites as National Environmental Study Areas (NESAs) following a request to do so by a local school system or other educational entity. These designations provide special recognition to areas which, by virtue of their resource values and history of educational use, have acquired particular educational significance.

Fish and Wildlife Service

The Fish and Wildlife Service administers 31 National Wildlife Refuges which are, at least in part, located on Atlantic or Gulf Coast barrier islands. They are fairly well distributed along the coast from Maine to Texas in 12 of the 18 States.

The total area of these 31 refuges is 388,582 acres. In addition, nearly 180 miles of beach are contained within the refuge boundaries.

The FWS anticipates acquisition of at least two more areas containing a total of about 44,000 acres and 14 miles of beach. Six other area acquisitions are being considered.

The refuges are managed in order to protect a wide variety of animal species and their habitats. Another important purpose of the refuges is the fulfillment of U.S. responsibilities for migratory birds, as established in treaties with Great Britain (on behalf of Canada) and Mexico. Management practices on the refuges often aim at improving, and sometimes creating habitats through artificial impoundments. However, because development would be inimical to the natural environment required by the animals, generally the refuges are kept natural.

Visitation is becoming increasingly important on the refuges; the USFWS is placing emphasis on providing opportunities for interpretation and public recreation on the refuges. Seasonal gatherings of immense numbers of migratory birds or the opportunity to see an endangered species are of great interest to the public, and more and more visitors are coming to see them.

Fiscal year 1978 visitation figures indicate that total visits to wildlife refuges amounted to over 9.4 million. Slightly more than 11% of the visitation was related to education-interpretation programs.

The National Wildlife Refuges often occupy barrier island land and waters including large areas of marshes and bays. These exceedingly productive ecosystems provide key habitats for a large variety of fish and wildlife among which are a number of species listed as endangered, such as the bald eagle, brown pelican, whooping crane, peregrine falcon and leatherback turtle.

The Service also has primary responsibility for implementation of the Endangered Species Act which requires all Federal agencies to take whatever action is necessary to insure that their activities will not further jeopardize an already endangered species of plant or animal, or result in the destruction or modification of habitat critical to the existence of that species. Through the medium of early consultation between the Service and an agency proposing an action which may adversely affect fish or wildlife habitat or endangered plant species, those adverse impacts frequently are avoided.

The Service also has an active program for administration of Research Natural Areas (RNA). RNA are set aside to protect "a representative array of all significant natural ecosystems" for the purpose of understanding these ecosystems and as a baseline for comparison with manipulated ecosystems. RNA have significant long term value for environmental monitoring and research.

The Service has established nine RNA's totalling 3,830 acres on six barrier island refuges.

Wilderness

Designation by the Congress of barrier islands as wilderness represents the greatest possible level of protection that can be given to the island units.

In accordance with the provisions of the Wilderness Act of 1964, the Fish and Wildlife Service and National Park Service barrier island units are being studied for possible inclusion in the wilderness system. Ten areas on wildlife refuges already have been established and range in size from a six acre wilderness area at Pelican Island NWR on Vero Beach, Florida, to one of 29,000 acres at Cape Romain NWR on Cape Island, Raccoon Key, and Bulls Island, South Carolina. Four other refuges have been studied and found to lack qualifications for the establishment of wilderness areas, while four others have been found to be qualified, and the departmental recommendations are awaiting congressional action. One of these is for Assateague Island and is a joint FWS-NPS proposal.

The amount of barrier island refuge acreage included in the Wilderness System is slightly more than 61,000. The four refuges on which wilderness areas have been proposed amount to 26,593 acres. Of this, 7,195 acres are included in the wilderness proposals.

Thirteen refuges which include barrier island acreage have been established since enactment of the Wilderness Act in 1964, and have not been considered for wilderness status. These 13 refuges vary from less than 30 to over 24,000 acres and total 64,200 acres.

Wilderness areas have been designated on two NPS areas (Gulf Islands and Everglades) and the only currently proposed area is included in the joint FWS-NPS proposal for Assateague. The Gulf Islands wilderness contains 1,800 acres; another 2,800 have been identified as potential wilderness. The Everglades designation involves 1,196,500 acres; another 81,900 acres have been identified as potential wilderness. The proposed NPS area for Assateague involves about 440 acres.

Two areas have been found unqualified for wilderness status (Padre Island and the Florida portion of Gulf Islands National Seashore). Five areas currently are being studied or are programmed for study in the near future.

Coastal Zone Management

The Coastal Zone Management Act (CZMA), administered by the Office of Coastal Zone Management (OCZM) in the Department of Commerce, has potential for providing mechanisms to protect barrier islands, particularly through State and local government initiatives.

The provisions of the Act that most directly relate to barrier island protection are those that provide financial assistance to States to develop and implement comprehensive coastal resource management programs and those that provide funds for the acquisition or further protection of barrier islands (through the shorefront access and barrier island acquisition, estuarine sanctuary, and coastal energy impact program provisions).

The Act provides funds for States to develop and implement comprehensive management programs addressing the needs for resource use and protection in a State's coastal zone. Up to 5 years of funding to develop a program is available to eligible States. Authorization for program development purposes expired in September 1979.

Subsequent to approval of its management program by the Secretary of Commerce, a State is eligible for funding to implement and operate its approved program. Funding authorization for this section also expired in September 1979 but is anticipated to be extended for at least another 5 years. In addition, once a State's coastal management program is approved, Federal agencies are required to conduct all activities, including the issuance of licenses, permits and federal financial assistance, consistent with the approved management program to the greatest extent possible.

Of the 35 States and territories (including the Great Lakes States) eligible to participate in the program, 15 already have federally approved programs, covering over 50% of the Nation's shoreline. Six of the 18 Atlantic and Gulf Coast States have approved plans and are receiving grants to administer and implement the programs. Within the next 2 years, it is anticipated that at least 27 States will have approved management programs, covering over 75% of the Nation's coastline.

A number of requirements in the Act for Federal approval are potentially important in promoting protection of barrier islands. These requirements include provisions for States to: (1) identify uses subject to the management program and the standards by which these uses are to be allowed or prohibited; (2) inventory and designate geographic areas of particular concern; (3) include procedures for designating areas for preservation or restoration; and (4) develop a planning process for the protection of and access to public beaches and other public coastal areas of environmental, esthetic or ecological value.

These provisions have been used by a number of States to afford barrier islands greater protection than existed before coastal management programs went into effect. For example, Rhode Island has made it a matter of State policy to prohibit future development on presently undeveloped barrier beaches. South Carolina's management program includes policies for discouraging new public investments in infrastructure (such as roads, bridges or sewage facilities) on undeveloped barrier islands.

Of the 3 provisions that could be used for barrier island acquisition, the one with the most direct relevance is Section 315(2): Shorefront Access and Barrier Island Acquisition. However, it also has been the least used. Although $25 million annually is authorized through FY 80 to remain available until expended, no funds yet have been appropriated for this program.

The estuarine sanctuary program authorized by Section 315(1) of the Act is designed to preserve representative estuarine areas around the Nation in their natural states. These sanctuaries may be used for research and education purposes. While not specifically designed to protect barrier islands, such islands - in part or whole - may be acquired as part of a sanctuary. Since 1974, 5 sanctuaries have been established in Oregon, Georgia, Hawaii, Ohio and Florida at a cost of $5.9 million, including maintenance and operations. Two more sanctuaries in California and Florida are in the process of being established. The sanctuary in Georgia includes a barrier island and a marsh, and the one being established in Florida includes 3 barrier islands.

The Coastal Energy Impact Program authorizes grants and loans to States and localities to help them deal with the impacts of energy development, production, and transmission, particularly activities associated with outer continental shelf oil and gas development. One particularly relevant grant provision is designed to prevent, reduce or ameliorate unavoidable losses of valuable environmental or recreational resources when such losses are the result of coastal energy activity. However, this environmental grant provision is funded at only $1.5 million per year and no State has yet used these monies to acquire barrier islands.

Floodplain Management, Executive Order 11988

Executive Order 11988, Floodplain Management, signed May 24, 1977, established new Federal policy for executive agencies and requires Federal agencies to avoid, to the extent possible, the long and short term adverse impacts associated with activities in floodplains, and to avoid the direct or indirect support of floodplain development. It requires agencies to issue new or amended procedures to ensure the nonhazardous use of riverine, coastal and other floodplains.

The Order applies specifically to agencies that: (1) acquire, manage, or dispose of Federal lands and facilities; (2) undertake, finance, or assist in construction and improvements; and (3) conduct activities and programs affecting land use, including planning, regulation, and licensing.

The term "base floodplain" is used as the measurement for determining, in most cases, when the Order applies, and refers to the area subject to a flood having a one percent chance of occurring in any given year (100 year flood). The "critical action" floodplain is the other measurement used, and refers to the area having a 0.2 percent chance of flooding in any year (500 year flood). As stated within the Order "this determination shall be made according to a Department of Housing and Urban Development floodplain map or a more detailed map of an area, if available."

Based on floodplain maps for a sampling of areas, a high percentage of the land area on barrier islands (up to 85%) is located in floodplains covered by the Order.

Each agency has the responsibility to evaluate the potential direct and indirect effects of any actions it may take in a floodplain, and ensure that its planning programs and budget requests reflect adequate consideration of flood hazards and floodplain management.

The Water Resources Council issued guidelines on February 10, 1978, outlining the major steps in the decisionmaking process an agency should follow when proposing an action which would be located in the base floodplain. The procedures recommended by the guidelines state that once an agency determines an action is located in the base floodplain (or critical action floodplain for proposals such as hospitals or facilities producing toxic water-reactive materials), the agency must then notify the public early enough for there to be a meaningful public input. The Order additionally requires agencies to consider all practicable alternatives to the proposal, including alternative siting or the alternative of taking no action. The impacts to the floodplain that would occur from the action must be fully identified. Adverse impacts must be minimized, and natural and beneficial floodplain values must be restored and preserved.

The Order also requires any requests for new authorizations or appropriations transmitted to the Office of Management and Budget to indicate when a proposed action would be located in a floodplain, and if in a floodplain, whether the proposed action is in accord with the Order. Because so much of the land on barrier islands is located in floodplains, the Executive Order on floodplain management, in combination with the Executive Order on the protection of wetlands (discussed separately), could provide substantial protection to the barrier islands' ecosystems. Although neither Order constitutes a prohibition on Federal involvement when floodplains or wetlands are involved, a complete prohibition is not feasible.

Without a clear requirement that Federal agencies objectively assess the effects of growth and development induced by their actions on floodplain values, the effectiveness of the Executive Order may be less than optimal.

It is these long-term impacts of progressive development which have the greatest potential for compromising floodplain and wetland values. It is in this area where agencies are the most reluctant to undertake an analysis and where, once undertaken, an analysis is most likely to be inadequate.

Protection of Wetlands, Executive Order 11990

Executive Order 11990, issued on May 24, 1977, directs Federal agencies to provide leadership in minimizing the destruction, loss, or degradation of wetlands. All agencies are ordered to avoid "to the extent possible" the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands whenever there is "a practicable alternative." Like Executive Order 11988 relating to floodplains, the Order is both procedural and substantive, and applies to agencies involved in (1) acquiring, managing and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities affecting land use, including but not limited to water and related land resources planning, regulatory, and licensing activities.

The Wetlands Order was issued at the same time and contains many identical provisions as Executive Order 11988.

The Wetlands Order differs from the Floodplain Order, however, by specifically delineating the major factors agencies must consider when proposing an action located in a wetland area. The factors that must be considered are: the public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; sediment and erosion; maintenance of natural systems including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; recreational, scientific, and cultural uses.

The Order does not apply to private permits for activities involving wetlands on non-Federal property, because that would be duplicative of Section 404 permits. The Wetlands Order also does not apply to any Federal activity as does the Floodplain Order, but only to new construction undertaken in or affecting wetlands. The Wetlands Order does, however, require Federal leases, easements, or deeds involving non-Federal parties to reference in the conveyance restricted uses as identified by any Federal, State or local wetlands regulations.

The review required by the Order is very comprehensive, and should have wide application to many environmentally-damaging projects now undertaken by the Federal Government on or near barrier islands.

The Order, although not quite as broad as the one for floodplains, will require Federal agencies to seek all practicable alternatives to new construction in wetlands and should significantly reduce dredge and fill operations, beach reconstruction, and groin or seawall construction on the barrier islands.

Environmental Impact Statement Reviews

The National Environmental Policy Act (NEPA) requires all Federal agencies to take into account the value of environmental preservation in their activities and prescribes certain procedural measures to ensure that such values are fully respected. An important aspect of the law is the requirement of preparation of Environmental Impact Statements (EIS) for every proposal for legislation and other major Federal actions significantly affecting the quality of the human environment.

EIS's and environmental assessments under NEPA may be required for permits (e.g. Corps of Engineers, Coast Guard, Environmental Protection Agency), grants of money (e.g. Federal Highway Administration, Economic Development Agency, Office of Coastal Zone Maragement), and new housing (e.g. Department of Housing and Urban Development). Environmental review must also be undertaken for direct Federal projects and for land use management or disposal proposals (e.g. Department of the Interior, Department of Defense, General Services Administration).

CEQ regulations for implementing procedural provisions of NEPA became binding on all Federal agencies on July 30, 1979. The purpose of the new regulations is to reduce paperwork, reduce delays, and produce better decisions.

The regulations emphasize the need for early cooperation among agencies with an interest in the proposed action and, further, emphasize the need for continued coordination throughout the process.

In preparing environmental impact statements, agencies are to make sincere efforts to involve the public in preparing the EIS and in its review. NEPA review is promoting progressively more reevaluation of projects affecting barier islands. A major case in point is the Fire Island Inlet to Montauk Point hurricane protection/ erosion control project, a major Corps of Engineer's shoreline stabilization project authorized in 1960 and potentially affecting 83 miles of Long Island's south shore. The environmental statement was the vehicle for bringing to light serious deficiencies in the analytical support for the project and, as a result of an administrative referral to CEQ (a process available for mediation of environmental issues) by Interior, the project is now being reformulated. As a spin-off, the Corps is now conducting a major study (through the Coastal Engineering Reseach Center) of barrier island evolution and sedimentary dynamics, which should provide considerable information useful in assessing the possible effects of a wide variety of actions affecting barrier islands. There are many other pending cases (e.g. St. Phillips Island Section 10 permit, Corps' Oregon Inlet stabilization project on the Outer Banks, etc.) where the NEPA process has been the primary vehicle for promoting reconsideration of questionable proposals. The more effective use of NEPA under the Council's new regulations holds great potential for improving our ability to protect barrier islands, provided there is sufficient monitoring of Federal programs to be sure that NEPA analyses are conducted for all actions having potential for causing significant impacts on barrier islands and that sufficient technical expertise is available for and brought to bear on Federal agencies' review of these analyses.

Air Quality Control

The Clean Air Act of 1970 established a two-phase strategy to maintain ambient air quality standards. First is the regulation of new indirect, or complex sources--those facilities likely to generate substantially increased vehicular traffic. Such facilities in the coastal zone might include new ports or marinas, waterfront recreational complexes, and large industrial plants. Under the Clean Air Act, assurance must be provided that such facilities will not result in the violation of air quality standards. Second, and still largely unformulated, the EPA air quality maintenance strategy calls for the development of growth plans and development of a long-term control strategy where such growth may lead to air quality deterioration.

Federal funds are available for up to two-thirds the cost of planning, developing, establishing or improving State air pollution prevention and control programs; and up to one-half the cost of maintaining such programs.

The authority under Section 309 of the Clean Air Act parallels that under NEPA and relates to the subject areas where EPA has jurisdiction or special expertise. It requires the EPA Administrator to "review and comment...on the environmental impact of any matter relating to...the authority of the Administrator contained in (1) any legislation proposed by any Federal department or agency; (2) newly authorized Federal projects for construction and any major Federal agency action other than a project for construction to which Section 102 (2) (c) of NEPA applies, and (3) proposed regulations published by any department or agency..." The Administrator's comments must be made public and if he determines that the matter under review "is unsatisfactory from the standpoint of public health or welfare or environmental quality, he shall publish his determination and the matter shall be referred to the Council on Environmental Quality."

This requirement brings within EPA purview any major Federal action proposal that impacts health, welfare, or the environment on the barrier islands. This includes actions in the territorial sea, the contiguous zone, or the oceans that would impact these islands.

EPA policy and regulations require that activities, such as those listed above, be in conformance with related statutory requirements. The Coastal Zone Management Act (CZMA) - which could provide special considerations for the barrier islands - requires:

1. that the requirements of the Federal Water Pollution Control Act and Clean Air Act be incorporated into CZM programs developed by the States, and

2. that all Federal activities in the coastal zone (including issuance of permits and licenses) be consistent with State CZM programs.

Flood Insurance Program

Section 1360 of the National Flood Insurance Act of 1968 authorizes the Secretary of the Department of Housing and Urban Development to enter into agreements with other agencies for the purpose of identifying and publishing information on floodplain areas which have special flood hazards.

One of the stated purposes of the Flood Disaster Protection Act of 1973 is to:

> "require the purchase of flood insurance by property owners who are being assisted by Federal programs or by federally supervised, regulated, or insured agencies or institutions in the acquisition or improvement of land or facilities located or to be located in identified areas having special flood hazards."

From 1936 through mid-1977, almost $10 billion in general tax revenues were invested in various flood protection works. In spite of the heavy Federal investment, annual flood losses have continued to increase. For urbanized areas alone, the flood loss is estimated at $1.5 billion per year.1/ This in spite of the relative absence of major hurricane activity along the east coast during the past 15-20 years; a period during which the urbanization of barrier islands has grown to about 14% as compared to 3% of the Nation as a whole. The rate at which the islands are urbanizing is about twice that of the Nation as a whole.

Flood damages result from man's generally ill-advised use of floodplains and his attitude that solutions to flood problems can be attained by altering the riverine or coastal environment rather than adapting his environment to that of nature.

The coastal flood hazard from hurricanes and other tropical storms is distinctly different than that of riverine floods. Coastal surge, wave action, high winds, and scouring make development of areas adjacent to open ocean extremely hazardous.

1/ J. Robert Hunter, Environmental Comment, June 1977

Yet demand for property in these areas has grown substantially in the period of remarkable quiescence in terms of hurricane activity along the east coast mentioned above.

The Flood Insurance Program's efforts to reduce flood losses are, in large part, dependent upon completion of the Flood Insurance Rate Maps (FIRM) for identification of flood prone and flood hazard areas.

FIA has given priority to mapping coastal floodplain areas. Of the nearly 300 units identified by this study, 188 are included in communities covered by the National Flood Insurance Program. As of May 4, 1979, 130 of these communities already were in the regular phase of the program; 55 still were in the emergency phase of the program; and 3 were not participating in the program. Of these 58:

36 have mapping studies underway

14 have mapping studies scheduled to start in FY '79

6 have no studies scheduled

2 have studies completed and are scheduled to convert to the regular program before the end of calendar year 1979.

Despite a high rate of participation and compliance by communities in the Flood Insurance Program, decisions about whether or where to locate in coastal high hazard areas do not appear to be affected by the program's minimum requirements or actuarial rates.

Therefore, the Federal Insurance Administration (FIA) has published regulations relating to construction on sand dunes and in mangrove areas and requiring consideration of wave scour under coastal structures. FIA also is considering incorporation of wave run-up in determination of minimum building elevation requirements. A study also is underway on the feasibility of implementing Section 1362 of the Flood Insurance Act which authorizes acquisition of severly damaged properties in flood prone areas.

These items, properly implemented and enforced, could aid substantially in protecting coastal high hazard areas from unwise development.

Moderate-level Protection Alternative

I. Developmental Project Evaluation

Objective: Ensure that strict environmental review is given to all projects on barrier islands proposed or assisted by Federal agencies.

Discussion: The Federal actions which affect the barrier islands most dramatically and directly are Federal construction projects or development projects funded through loans and grants made to other governmental entities or private citizens. A number of agencies have been identified as supporting development on barrier islands through loan or grant programs; others such as the General Services Administration, Fish and Wildlife Service, National Park Service and Corps of Engineers however, are specifically responsible for Federal facility construction. The options presented address all federally assisted programs directly related to development projects.

Prior to approval, development project applications are subjected to two types of review. These consist of the environmental impact analysis required by the National Environmental Policy Act (NEPA) and regulations issued by the Council on Environmental Quality (CEQ) implementing NEPA, and the approving agencies' own procedures for awarding loans and grants.

A number of grant programs induce growth on the fragile resources of the barrier islands. This growth should be limited to those areas where its impacts are determined to be least detrimental to these resources. Approval of any grant should be conditioned on soil suitability and capability to accommodate the proposed project. Areas unable to support growth-inducing proposals should remain in open space, contributing to the overall protection of the natural resources on the islands. It is essential that Federal development program managers consider the influence, either direct or indirect, their programs have on the patterns of land use and on the rate of timing of development occurring on a barrier island.

Special attention should be given to the various loan and grant programs which subsidize development and which could have significant effects on the barrier island environment. It is critical, therefore, that the programs be carefully monitored. For example, loans and grants for constructing or expanding areawide wastewater treatment facilities or water and sewer lines, assistance to small-business concerns, or disaster relief construction on barrier islands, should be limited to those facilities essential to the health and safety of the residents or critical for the protection of the environment. Furthermore, since the relationship between wastewater treatment and high-quality domestic water sources is extremly critical on the barrier islands, wastewater treatment projects on barrier islands should be in accordance with the current water quality management plan and with the State Coastal Zone Management plan.

The development of an environmental impact statement (EIS) or environmental assessment (EA) for each proposed development or reconstruction project on a barrier island would greatly enhance the protection effort. Once a development proposal is approved, it serves as a catalyst for more development which may overtax the physical capabilities of the barrier island and expose large numbers of people to extremely hazardous conditions. Hence, all projects should fully consider both the direct and indirect impacts which approval would bring.

Any EIS and EA for a barrier island project should address all potential hazards; carefully analyze all feasible alternatives to the proposed project; identify the measures to minimize or mitigate possible impacts; and provide the burden of proving the necessity of locating the proposed project on a barrier island. Through the EIS process, the public benefits from any proposed project on a barrier island would be affirmed; the costs to the public, as well as any loss of resources, would be recognized; and finally, potential conflicts between supported development and areas deserving protection would be minimized. There is no doubt that Federal agencies need to better analyze developmental proposals on barrier islands as to their impacts on the natural resource and the consequences of natural hazards. The EA and EIS are the tools for ensuring that full analysis and consideration is given to a project's merits and detriments before any approval is finalized.

It is also essential, however, that all agency procedures ensure that severe environmental constraints surrounding developmental projects on barrier islands will receive a comprehensive review. Agency approval procedures should specify how the barrier island constraints, such as island migration, storm vulnerability, water supply, and endangered species would be fully addressed in the project's design and construction. The procedures should be directed to ensure that all projects undertaken or subsidized by the Federal Government on barrier islands would endure through their useful life cycle.

A Federal program, usually undertaken for a State or a political subdivision within the State, and which has no specific agency approval procedures, is the Corps navigation program. Navigational dredging is performed to maintain channels, turning basins, harbors, and marinas and it exerts a profound long-term effect on the dynamic sand-sharing system essential to perpetuating the barrier islands.

The need constantly to remove sediment from the various above-mentioned areas creates an enormous amount of dredge "spoil" which should be disposed of in an economical, but environmentally sound manner. Instead the practice has been to dump much of the spoil in tidal marshes, primarily because alternative methods are more expensive and the Corps does not always have the right equipment at the right time so as to minimize expenses. In some instances on troublesome shoal areas, the Corps has, for economic reasons, dredged to an overdepth as advance maintenance to prevent the requirement of returning to the same project two or more times in the same dredge season.

The Corps has recently, however, made a major effort to reduce the inputs of spoil disposal. One of the benefits of this effort is the creation of hundreds of acres of spoil islands providing prime wildlife habitat for colonially nesting short birds.

Navigational dredging also may have potential adverse effects on many historic and archeological resources around barrier islands, including ship wrecks and submerged prehistoric sites. If not properly identified and mitigated by avoidance or related actions, such impacts could include irreversible and irretrievable commitments of these resources. Current interagency coordination efforts,often associated with the NEPA process, have proven very effective in reducing the severity of impacts from disposal of spoil and navigational dredging.

Options:

1. In determining a proposal's "significance" under NEPA and CEQ's regulations (40 CFR (Section 1508.27) Federal agencies should give thoughtful consideration to the barrier island's unique natural processes and inherent hazards. The natural dynamics of barrier islands mandate stricter application of NEPA's test of "major Federal actions significantly affecting the quality of the human environment"; Federal actions that would not be significant if proposed elsewhere, would in most cases, be significant for NEPA purposes when proposed on barrier islands.

2. All agencies responsible for programs which undertake or provide assistance for development projects on barrier islands should be required to demonstrate that their approval procedures provide for critical review of projects which have the potential to increase population growth or land development or which lead to any one or more of the following:

    a. destruction of wetlands or significant areas of fish or wildlife habitat;

    b. shoreline erosion (or changes in shoreline erosion) which lead to potential damage to structures and real property;

   c. questionable ability of the population to reach mainland areas for safety, or to be temporarily housed in physically safe structures during times of intense storms;

   d. reduction in existing fresh water table or quality of groundwater; or

   e. inadequate sewage and/or solid waste disposal.

3. An effort should be undertaken by all Federal agencies to avoid direct or indirect support or approval of barrier island development proposals where there is a practicable alternative. In addition, each agency should develop specific factors which must be analyzed in the assessment of potential adverse impacts from all proposed projects.

4. New Federal construction or reconstruction or the leasing of excess Federal building space in hazardous barrier island locations should be restricted unless such space is essential for reasons of health, safety, or other public service and there is no feasible alternative. Restricting growth-inducing Federal facilities such as offices, warehouses, and the like to safer mainland sites may reduce related development pressures on the islands. Likewise, Federal facilities which are damaged by storms and which are not required for purposes of public health or safety, should be removed and not rebuilt on the hazardous barrier islands.

5. Minimize navigational dredging to reduce adverse impacts to the aquatic and terrestrial ecosystems. Spoil material should not be deposited on, near, or within the land and water areas of the barrier islands unless long-term benefits are demonstrated.

6. The siting of primary energy facilities on the barrier islands should be restricted unless there is no practicable alternative. Undeveloped and unprotected barrier islands should be provided protection from energy facility developments to the maximum extent feasible. Energy facilities proposed for sites on barrier islands should be planned and developed with careful consideration for the remaining resource values on the islands and for the potential impacts on adjacent islands.

7. Require all approved wastewater treatment projects on barrier islands to be in accordance with a current water quality management plan and with a State Coastal Zone Management plan.

Agencies and Programs Affected:

1. Environmental Protection Agency (EPA)

   A. The Clean Water Act (Clean Water Act of 1977 and the Federal Water Pollution Control Act Amendments of 1972; P.L. 92-500; 33 U.S.C. 1281 et seq.) authorizing:
   a. Wastewater Treatment Construction Grants (Sec. 201)
   b. Water Quality Management Planning (Sec. 208)
   c. National Pollutant Discharge Elimination System (NPDES) (Sec. 402)
   d. Permits for Dredged or Fill Material (Sec. 404)

   B. Clean Air Act of 1963, P.L. 88-206, 42 U.S.C. 1857; as amended by P.L. 91-604, the Clean Air Act Amendments of 1970.
   a. State Implementation Plans (SIP)
   b. Air Quality Maintenance Areas (AQMA)
   c. Air Pollution Program Grants
   d. Section 309 Review

2. Small Business Administration (SBA)

   The Small Business Act of 1953, P.L. 83-163, 15 U.S.C. 631 as amended.

3. Economic Development Administration (EDA)

   The Public Works and Economic Act of 1965, P.L. 89-136, 42 U.S.C. 3121.

4. General Services Administration (GSA)

   The Federal Property and Administrative Services Act of 1949, as amended, and Public Law 93-288, Title IV.

5. Farmers Home Administration (FmHA)
   The Consolidated Farm and Rural Development Act (P.L. 92-419, 7 U.S.C. 1921 as amended by P.L. 93-237, 15 U.S.C. 633); the Housing Act of 1949 and the Food and Agriculture Act of 1962.

6. Department of Housing and Urban Development (HUD)
   The Housing and Community Development Act of 1974 (P.L. 93-383), 42 U.S.C. 5301; Housing and Community Development Act of 1977 (P.L. 95-128); Interstate Land Sales Full Disclosure Act established by Title XIV of P.L. 90-448, 15 U.S.C. 1701.

7. U.S. Army Corps of Engineers
   Flood Control Act of 1941 (P.L. 84-99, 33 U.S.C. 701n; 77-228, 33 U.S.C. 701(b) et seq as amended by P.L. 87-874); Rivers and Harbors Act of 1960 (Sec. 107, P.L. 86-645 as amended).

8. Federal Emergency Management Agency (FEMA)
Disaster Relief Act of 1974, P.L. 93-288, 42 U.S.C. 5121.

9. Department of Energy (DOE)
Atomic Energy Act of 1954, P.L. 83-703, 42 U.S.C. 2011, as amended. Energy Reorganization Act of 1974, P.L. 93-438, 42 U.S.C. 5801. Department of Energy Organization Act, P.L. 95-91, 42 U.S.C. 7101.

II. Flood Insurance

Objective: To promote wiser use of barrier islands through prompt identification and mapping of the high hazard areas and reflection of those hazards in federally sponsored flood insurance programs affecting barrier island properties.

Discussion: Under the provisions of the Flood Disaster Protection Act of 1973, communities having one or more identified special flood hazard areas must enter into the National Flood Insurance Program or be denied Federal or federally related financial assistance for acquisition or construction purposes within those areas.

Property owners may buy flood insurance at a rate lower than normal actuarial rates due to a subsidy by the Federal Government. In communities where actuarial rates have been determined, "regular program" coverage permits policy owners to purchase at actuarial rates a second level of coverage, equal in amount to the established limits.

From the outset of the Flood Insurance Program, the minimum flood plain management requirements have been building requirements. That is, guidance to reduce flooding impacts has been directed, primarily to structural rather than locational considerations.

The National Flood Insurance Act of 1968, as amended, provides authorities to the Secretary * not only to identify and publish information with respect to all flood plain areas (Sec. 1360(a)(1)) and to establish flood risk zones (1360(a)(2)), but also to: "develop comprehensive criteria designed to encourage, where necessary, the adoption of adequate State and local measures which..." will improve the management of flood prone areas and to assist States and local governments to acquire properties located in flood risk areas and which are severely damaged by floods. The Flood Insurance Program considerations are very important in any plan to protect barrier islands from unwise development, particularly since a large majority of island land is located in the 100-year flood plain.

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* Or representative as directed by the Housing Authorization Act (12 U.S.C. 1701)

The 100-year flood plain is now calculated on the basis of still water elevations. The effects of storm surges are not taken into consideration for coastal zones. These dramatically influence flood levels and damage in coastal areas. Barrier island flood prone areas present a number of hazards in addition to wave crest and run-up not encountered in riverine or other flood plains, e.g., wave scour, extreme high winds, and wave uplift.

Options:

1. Federal Insurance Administration (FIA) - Higher priority should be placed on flood plain mapping for barrier islands. Although the FIA has placed emphasis on completing coastal flood plain mapping, the fact remains that substantially increased efforts will be required to meet the congressionally mandated completion date of 1983. Once the mapping and precise delineation of flood hazard areas is completed, insurance rates and construction standards for many barrier island communities will be affected.

2. In calculating the 100-year flood elevations on barrier islands, the height of wave crest and run-up should be included as an integral part of the process.

3. To adequately reflect these unique hazards, Federal Insurance Administration should consider modifying its regulations to differentiate between the types and degrees of hazard. Incorporating this information into determination of rate structures may reduce risk to life and property and further protect the natural resource values on the islands.

4. Upon completion of flood plain mapping for barrier islands, FIA should consider developing actuarial rates specifically related to barrier islands and which reflect the true risks of developing on barrier islands. These insurance rates would, undoubtedly, be higher. Hopefully, decisions on where and how to build would be affected by the higher rates; the islands natural features would be protected; and, costs to the general taxpayer from insurance subsidies would be reduced.

5. Once the true risks are reflected in the actuarial rates and construction standards, FIA should ensure adequate levels of inspection and enforcement of approved building codes as a qualification for flood insurance eligibility. Building codes and other regulations affecting development on barrier islands are only as effective as the quality of inspection and enforcement. FIA should establish minimum quality standards for inspectors and require certification of inspectors as a requirement for flood insurance eligibility.

6. FIA regulations for insurance eligibility should include local requirements that new construction or reconstruction be located landward of the reach of mean high tide.

Agency and Programs Affected:

These options would affect only programs and authorities of the Federal Insurance Administration which are: National Flood Insurance Act of 1968, P.L. 90-448, 42 U.S.C. 1441, as amended by the Housing and Urban Development Act of 1968, P.L. 91-152, and the Housing and Community Development Act of 1974, P.L. 93-383, 42 U.S.C. 4001, as amended by the Housing Authorization Act of 1976, P.L. 94-375, 12 U.S.C. 1701.

III. Disaster Mitigation and Recovery

Objective: To promote the use of disaster assistance and coastal protection programs to guide future uses of barrier islands so as to minimize the loss of natural values, reduce the loss of human life and property, and lessen costs to the general taxpayer resulting from unwise development of high hazard areas on barrier islands.

Discussion: Several Federal programs are designed to provide assistance to States, local governments, individuals, and owners of selected non-profit facilities to alleviate suffering and damage which result from natural disasters. These programs also assist in the reconstruction and rehabilitation of devastated areas including those located in hazardous locations on barrier islands.

The Disaster Relief Act of 1974 authorizes establishment of disaster preparedness plans, utilizing all appropriate agencies. It provides for technical assistance and grants to the States in developing comprehensive disaster plans and programs, to include hazard reduction, avoidance, and mitigation. Section 401 authorizes the repair, reconstruction, restoration or replacement of any facility owned by the United States which is damaged or destroyed by any major disaster if it is determined that such a facility is necessary. In implementing the section, the appropriate Federal agency is responsible for evaluating the natural hazards to which the facility is exposed and is required to take the necessary action to mitigate such hazards.

Under Title VIII of the Act, Recovery Planning Councils may be authorized and established following a major disaster. These Councils are responsible for determining when and under what conditions recovery investment plans should be prepared. This provision generally has been interpreted to be a vehicle to get a maximum amount of recovery assistance into a devastated area as quickly as possible.

The Small Business Administration (SBA) also provides disaster assistance loans for reconstruction or restoration of property to redisaster conditions. Funds are available to a wide variety of institutions and to individuals.

The U.S. Army Corps of Engineers administers coastal protection works programs which: (1) provide assistance for repair and restoration of flood damages and shore protection works damaged by storms; and (2) provide assistance to State and local governments for emergency operations, including rescue, during flood periods. The first program permits the restoration of coastal protection structures which control or restrict the normal retreat or erosion of barrier islands and their beaches and promotes a false sense of security in island inhabitants.

Federal disaster mitigation and recovery programs should be redirected to assure that they do not simply perpetuate past mistakes by encouraging or subsidizing reconstruction or restoration of storm damaged structures in high hazard areas.

Options:

1. Federal Disaster Assistance Administration (FDAA) and Small Business Administration (SBA) should consider developing regulations by which to condition receipt of pre-disaster planning assistance and post-disaster loans or grants on adoption of standards in State disaster recovery plans which would:

   a) incorporate the State's own disaster legislation and require its full implementation;

   b) require a recognition that barrier islands are areas particularly vulnerable to disaster;

   c) be adequate to protect human life by discouraging development of high hazard areas; and

   d) require State preparation of "contingency redevelopment plans" which will encourage reconstruction away from barrier islands.

2. Corps of Engineers - Strengthen the role of the Corps of Engineers in coastal protection by emphasizing the natural protective capabilities and the need to preserve the ecological integrity of wetlands, beaches, and dunes.

3. Encourage the Corps shift away from increasingly expensive structural control of erosion and flooding toward cooperative land management.

4. Restrict development of erosion and flood control structures on undeveloped barrier islands except in exceptional circumstances and then only where it can be demonstrated that the proposed stucture will not adversely affect other barrier island areas.

5. Require concurrence of the Secretary of the Interior for any erosion or flood control structure which may adversely affect an island administered by the Department of the Interior.

6. Restrict issuance of permits to dredge or fill in wetlands on a barrier island except in extreme cases of overriding national interest.

7. Require the Office of the Chief of Engineers to (a) develop and issue specific criteria and guidance regarding the significance of barrier islands; (b) prepare a uniform method for each Corps District to carry out its program operations on the islands; (c) define regulatory boundaries for District and Division Offices by which to identify jurisdictional control and to ensure consistency within the flood control and disaster assistance programs as they relate to barrier islands.

Agency and Programs Affected:

1. FDAA - Disaster Relief Act of 1974; P.L. 93-288; 42 U.S.C. 5121

2. SBA - Small Business Act of 1953, as amended; P.L. 83-163; 15 U.S.C. 631

3. Corps - Public Law 84-99, 33 U.S.C. 701n, Flood Control Act of 1941; 77-228, 33 U.S.C. 701b *et seq* as amended by P.L. 87-874. Flood Control Act of 1941; P.L. 77-228 as amended by P.L. 84-874

IV. Resource Evaluation and Planning

Objective: Increase emphasis by Federal agencies in identifying and evaluating barrier island resources possessing high natural, cultural, or historical values, to ensure that the greatest degree of protection feasible can be provided to these values.

Discussion: The data collected for the barrier island study provides an excellent overview of the scope and variety of the barrier island resource, the magnitude of the problems and opportunities presented by that resource, and of the impacts Federal programs have on barrier islands. However, the study also emphasized that much more needs to be accomplished to identify and evaluate specific kinds of resources and values for designation and protection under a variety of classifications. In other words, it is necessary to know what the special values are before plans and programs can be developed and implemented for protection of the unique opportunities barrier islands can provide.

Consistent basic management goals and policies for protecting and/or enhancing the islands and resources are extremely important and should be provided through a comprehensive planning process. To be an effective guide for decisionmaking, management goals for Federal lands must be responsive to legislative and administrative constraints on the management of a particular area as well as to the conditions and trends occurring in the area itself and in its surrounding region. Particularly important is a comprehensive information base on the particular barrier island environment and on the effects of various influences upon it.

A systematic, interdisciplinary planning process should provide the vehicle for formulating alternative strategies for achieving the management objectives of a particular island, for objectively assessing the environmental and other consequences of these strategies, for integrating a particular island into its regional ecological and socioeconomic environment, for carrying out cooperative activities with other agencies and interests, and for involving a relatively large segment of the public in determining an island's future. Such a planning process also should provide a comprehensive public record of decisionmaking, and by showing how environmental and other factors were weighed, help promote objective, balanced decisions on management and use. Most importantly, such a planning process should result in plans that provide sufficient information for programming the funds necessary to implement actions that are required to protect the environment and provide for resource compatible public use. The planning process also will highlight deficiencies in the total system that can be corrected by acquisition. The National Park Service has prepared management plans for its barrier island units which could serve as a model for State and other Federal agencies.

A number of existing Federal programs and resource classifications can be applied to barrier islands. Wilderness designation and the designation of qualified areas as Research Natural Areas and National Environmental Study Areas are three such classifications which could provide means to protect barrier islands.

Wilderness designation offers perhaps the greatest possible level of protection that could be given to a barrier island under Federal administration. Some studies of potential wilderness areas on NPS lands have been completed and others are underway. However, wilderness areas have been designated in only two NPS management units. In contrast, wilderness areas have already been designated on 12 FWS managed refuges and five other refuge areas have been recommended for designation.

Research Natural Areas (RNA's) are lands and waters set aside from existing Federal lands to protect a "representative array of all significant natural ecosystems" as baseline areas for the purpose of obtaining information for understanding and comparing these ecosystems with manipulated ecosystems. RNA's have significant value in long-term environmental monitoring and research, in detecting changes and trends in environmental conditions, and in providing objective information on which to base land management decisions.

RNA's currently receive no special legislative protection and are managed for educational and research purposes solely as a result of a particular agency's administrative commitment to do so.

To date, the only designation of RNA's on barrier islands has been done by the U.S. Fish and Wildlife Service within 6 units of the National Wildlife Refuge System. The National Park Service has not designated any RNA's on barrier island units, although all of the NPS units--except Wright Brothers National Memorial--have areas that potentially qualify.

National Environmental Study Areas (NESA'S) may be designated on Federal lands following a request to do so by a local school system or other educational entity. These designations provide special recognition to areas which, by virtue of their resource values and history of educational use, have acquired particular educational significance. NESA's may be designated wherever a site is of particular significance in carrying out environmental education objectives.

RNA's and NESA's have great potential for enhancing public understanding of the relationship between man and the barrier island environment, with particular emphasis on the hazards associated with human development and use.

The Land and Water Conservation Fund (LWCF), administered by HCRS, is another program with great potential for protecting barrier islands. To qualify for grants under the LWCF, States must have in existence a Statewide Comprehensive Outdoor Recreation Plan (SCORP), up-to-date and approved by the Secretary. The Fund then provides matching grants to States for the acquisition and development of public outdoor recreation areas and facilities. Such plans have been prepared by all 18 coastal States and have been approved, and all but one State have used the Fund for barrier island projects. However, the present HCRS guidelines for preparation of the SCORP contain no special provisions to promote protection and environmentally compatible uses of barrier island resources in general or of protected islands in particular.

HCRS also maintains a barrier island data inventory and data bank and provides for technical assistance as provided by its Organic Act. The data bank consists of about 50 bits of information on each of the nearly 300 units identified in the study. These data bits include information on physical attributes as well as development status, ownership, management, and other characteristics. Such information is vital to the discernment of changing trends and to the development of long-range management plans and objectives.

HCRS also is responsible for evaluating and designating significant natural, historic, and cultural areas on barrier islands which qualify for inclusion on the National Registry of Natural Landmarks and the National Register of Historic Places. Even though barrier islands contain sites of the first landings by explorers and were the location for numerous early settlements, no coordinated systematic review and inventory of cultural, historic and natural resources has been conducted on barrier islands. The listing of a resource does not guarantee it will be protected totallv, but such action does highlight the significance of the resource.

The Historic Preservation Fund, also administered by HCRS under the authority of the National Historic Preservation Act of 1966, provides matching grants for historic preservation to States from an annual appropriation for that purpose. The States may use the grants for surveying, evaluating, acquiring, and preserving significant cultural resources.

The Office of Coastal Zone Management (OCZM) administers a grant program to assist States in developing comprehensive management programs for their coastal zones. The management program must make provisions for procedures to designate specific areas for the purpose of preserving or restoring them for conservation, recreational, ecological, or aesthetic values. Once their programs have been approved, States then are eligible for financial assistance to administer the programs. Six of the 18 Atlantic and Gulf Coast States have approved programs and are receiving administrative grants to implement the programs. Five additional States should have their programs approved within a year.

The Office of Coastal Zone Management should encourage States, through use of grant allocations, to use their approved coastal management programs to provide greater protection to barrier islands. Working with other NOAA units with scientific data and expertise, OCZM also should provide technical assistance to States regarding hazards and impacts of special significance to barrier islands and suggested techniques for mitigating and avoiding these hazards.

The FWS is responsible for preparing inventories and lists of rare and endangered species of both plants and animals existing on barrier islands. Once a species is identified as being rare or endangered, the FWS delineates the areas of critical habitat for those species. Although many species of animals have been listed, many of the plants have not. The designation of critical habitat gives the Endangered Species Act its most definitive thrust by providing strong protection from Federal actions that would adversely impact identified critical habitat.

Options:

1. In order to protect barrier island resources and values adequately, the National Park Service and the Fish and Wildlife Service should place high priority on identifying and evaluating those barrier islands, parts of islands, or groups of islands which exhibit qualities of national significance. The primary purpose would be to identify and establish protection priorities for those areas suitable for designation as Wilderness areas, units of the National Park System, National Wildlife Refuge System, or for inclusion on the appropriate national register for natural, cultural or historic areas.

2. The FWS should expedite the inventory and listing of rare and endangered species of plants and animals on barrier islands. Areas of critical habitat for those species should be delineated.

3. Emphasis should be given to designating qualified barrier islands (areas) as Research Natural Areas and National Environmental Study Areas. Federal land holdings on barrier islands should be assessed for their qualities as unique (or high quality representatives of types of) ecosystems that should be protected for their scientific values and/or as areas suitable to support environmental science educational programs.

4. In order to improve the extent to which barrier islands are given special recognition at State and local levels, HCRS should amend and expand the State Comprehensive Outdoor Recreation Plan (SCORP) guidelines to consider barrier islands as areas of special environmental importance in the planning process.

   Specifically, barrier islands should be named as "special areas of broader national concern" in Section 630.1.5B(7) of the HCRS Grants-in-Aid Manual.

   Guidelines should make provision for designating barrier islands as special environments where particular precautions will be taken to ensure that recreational use and development does not adversely affect the resources and natural processes which make diverse recreational activities possible.

   The guidelines should provide proposed strategies for management of natural and cultural resources; provision of interpretive, educational, and recreational programs and opportunities; development of park facilities; and the integration of strategies with other governmental agencies and private organizations.

   The SCORP's also should consider an assessment of suitability of barrier islands and their adjacent resources for designation as National Marine Sanctuaries, National Estuarine Sanctuaries, nomination to the National Register of Historic Places, or use as sites for environmental education.

5. The Office of Coastal Zone Management should encourage States, through use of grant allocations, to use their approved coastal management programs to provide greater protection to barrier islands. This can be accomplished by States establishing policies to limit or prohibit development on barrier islands, by designating such islands as geographic areas of particular concern for preservation purposes, and by using the access and shorefront protection planning element of their programs to identify acquisition and protection priorities for barrier islands. Federal agencies should implement actions in a manner consistent with State program policies that are designed to protect barrier islands to the greatest extent practicable.

6. HCRS should update the barrier island inventory and information base every five years.

   The inventory update would correct inaccuracies and account for changes in management and island conditions. The update should be published with appropriate maps and distributed to the eighteen coastal States to supplement their planning and operational activities. The information has relevance to planners and decisionmakers only to the extent that it is accurate and current.

7. FWS should expedite the development of comprehensive management plans for each of its barrier island refuges utilizing a systematic, interdisciplinary planning process.

8. The review and identification of undeveloped areas of NPS and FWS administered barrier islands which qualify for wilderness designation should be expedited.

Those areas where wilderness already has been designated should be reevaluated periodically to determine if additional acreage qualifies. More importantly, areas previously determined to be unqualified for wilderness designation should be reevaluated periodically to determine whether the responsible conditions still exist and whether they can be mitigated or eliminated sufficiently to qualify the area for wilderness. Areas where wilderness suitability has not been determined should be evaluated as soon as comprehensive plans can be scheduled. This applies especially to FWS barrier island related refuges added to the System since 1964.

Agency and Programs Affected:

1. HCRS - The Land and Water Conservation Fund Act - P.L. 88-578, as amended; 16 U.S.C. 1-4 et seq.

The Historic Sites Act; 16 U.S.C. 463

The National Historic Preservation Act of 1966; 16 U.S.C. 470

The Archeological and Historic Preservation Act, as amended; 16 U.S.C. 469

HCRS (BOR) Organic Act; 16 U.S.C. 1

2 NPS - The Act of August 25, 1916; 16 U.S.C. Section 1 et seq

The NPS Administrative Authorities Act; 16 U.S.C. 1-1a

The Wilderness Act 16 U.S.C. 1131-1136

The Park, Parkway, and Recreation Study Act; 16 U.S.C. 17

3. FWS - Fish and Wildlife Act of 1956; 16 U.S.C. 742(a)-754

Fish and Wildlife Coordination Act; 16 U.S.C. 661-667e

National Wildlife Refuge System Act; 16 U.S.C. 668 dd-668jj

Migratory Bird Conservation Act; 16 U.S.C. 701-718h

Endangered Species Act of 1973; 16 U.S.C. 1531-1543

Wilderness Act; 16 U.S.C. 1131-1136

Recreation Act of 1962 16 U.S.C. 460k-460k-4

4. OCZM - Coastal Zone Management Act of 1972, as amended;
   16 U.S.C. 1451

V Permit Process

Objective: Ensure that all permits or rights-of-way awarded for activities related to barrier islands would not alter or destroy existing natural resource values.

Discussion: A number of Federal agencies are responsible for issuing permits, rights-of-way and leases which could impact upon barrier islands. The Army Corps of Engineers, for example, through its responsibilities for Section 404 permits, has jurisdiction over all discharges of material into the waters of the United States. The Corps, then, has the power to encourage sound barrier island development by applying its wetlands protection policy which states that dredge or fill permits in wetlands will not be issued if there exists an alternative means. Furthermore, the Corps is required to consider and act upon factors other than navigation in deciding permit cases in the public interest. In regard to barrier islands, storm hazard mitigation and the protection of valuable resources are two obvious factors which should be considered in determining the public interest.

Another very critical permit program and one that could have detrimental impacts upon barrier islands is the Coast Guard's bridge permit program. It has been the practice of the Coast Guard to issue bridge permits unless the proposed structure would interfere with navigation.

Until recently, neither the Coast Guard nor the public adequately considered the crucial role bridges play in promoting and making possible the development of barrier islands. Bridge permits were not evaluated on the basis of environmental, social economic, or hazard factors unrelated to decisions regarding navigation. To date the Coast Guard has no current regulations that spell out the regulatory test which the agency will apply in evaluating bridge proposals that lead to barrier island development or that set forth the burden of proof which a bridge permit applicant must satisfy in order to qualify for a permit. While the Coast Guard does have NEPA regulations, and has been preparing environmental impact statements, it is not clear whether these impacts will be considered as the basis for agency decisionmaking.

Equally unclear are Coast Guard policies with respect to the administration of other statutory requirements and considerations. The Department of Transportation, the parent agency, has adopted a wetlands protection policy, DOT Order No. 5660.1, May 21, 1975. While wetlands are usually found in association with barrier islands, the Coast Guard has yet to decide how it will apply the DOT policy to bridge and development cases.

Similarly, Section 4(f) of the DOT Act of 1966, 49 U.S.C. 1653(f), forbids the agency from sponsoring or approving projects that would use publicly-owned land that is important for wildlife and recreation, unless there are no feasible alternatives and all planning measures have been taken to reduce the impact of the project on public wildlife and recreational resources. An unresolved question is whether tidal marshlands, generally deemed "public trust" lands, and certainly important for wildlife and recreation, come under the protection of Section 4(f) and what the Coast Guard policy in bridge cases affecting these marshes will be.

Further, the Coast Guard has no clear policy on how it will administer the bridge permit program so as not to prejudice or compromise the later administrative decisionmaking of other agencies.

Finally, the Coast Guard has not determined how it will deal with the Federal policies designed to prevent unsound development in flood-prone areas, such as those universally found on barrier islands.

Other types of permits and/or leases affecting barrier islands consist of use of or rights-of-way across lands owned by the Federal Government. The two primary Federal land managing agencies for barrier islands are the National Park Service and the Fish and Wildlife Service. Concern and a careful review should be given to any type of use permit or right-of-way proposed for Federal land on the barrier islands. Rights-of-way requiring special attention include pipelines, roadways, or utilities which could be harmful to island resources and coastal character. Use permits include activities not requiring long-term use of lands and waters, which may, in some cases, involve disturbance of barrier island resources.

Options:

1. Coast Guard - Restrict Federal permits for constructing, reconstructing, or expanding bridges to barrier islands to only those facilities essential to the health and safety of existing residents or critical for the protection of the island environment.

2. Army Corps of Engineers - Discourage Corps 404 dredging permits which would stimulate development on barrier islands. With regard to wetlands, permits to dredge and fill which would adversely affect barrier islands should be discouraged and, except in extreme cases of an overriding national interest, denied.

3. Issue rights-of-way and special use permits over Federally administered barrier islands only in cases where it has been shown through a systematic publicly reviewed process that substantial

public benefits will result, no feasible alternatives exist, and all possible measures have been taken to mitigate direct and indirect adverse environmental impacts on the Federal barrier island resource.

Agency and Program Affected:

1. U.S. Army Corps of Engineers: Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. § 1344, and § 10 of the Rivers and Harbors Act of 1899, 33 U.S.C. § 401, et seq.

2. The Department of Transportation: DOT Act of 1966, 49 U.S.C. 1655(g)(6).

VI. Executive Orders 11988 and 11990

Objective: Provide maximum support to the enforcement of Executive Orders 11988 and 11990.

Discussion: In conjunction with President Carter's 1977 Environmental Message, two executive orders were signed which potentially will be very effective in protecting barrier islands from unwise development: Executive Order 11988 on Floodplain Management, and Executive Order 11990, Protection of Wetlands. Together these orders are estimated to cover up to 85% of the land area of many barrier islands. Because many of the same values sought by this plan would have to be analyzed by Federal agencies before undertaking most projects, the Executive Orders are a very important component in a barrier island protection plan.

Executive Order 11988, Floodplain Management, established a new Federal policy by requiring all Federal executive agencies to issue new or amended procedures to ensure the nonhazardous use of riverine, coastal and other floodplains. The Order directs them to avoid, to the extent possible, the long and short-term adverse impacts associated with activities in floodplains, and to avoid the direct or indirect support of floodplain development.

Each agency has the responsibility to evaluate the potential direct and indirect effects of any actions it may take in a floodplain, and to ensure that its planning programs and budget requests reflect adequate consideration of flood hazards and floodplain management. An agency proposing or supporting an action in or affecting a floodplain must show that such an action is the only practicable alternative and must design its action to minimize harm to or within the floodplain and circulate a notice explaining why the action must be located in the floodplain.

The Water Resources Council (WRC) was directed to prepare guidance under the Order and to conduct periodic oversight of agency procedures and their effectiveness. The WRC issued guidelines outlining the major steps in the decisionmaking process an agency should follow when proposing an action which would be located in the base floodplain. The procedures state that once an agency determines a project will be located in the floodplain, the agency must notify the public early enough for there to be meaningful public input. The Order also requires agencies to consider all practicable alternatives to the proposal.

WRC has no explicit oversight authority for ensuring agency proposal compliance once the procedures are established, although Section 5 directs the WRC to periodically evaluate agency procedures and their effectiveness.

Effective implementation of the Floodplains Executive Order should foster increased awareness within Federal agencies of the hazards of barrier island development, and will also set an example for State and local decisionmakers to become more conscious of the impact of their actions on floodplains, particularly when located on barrier islands.

Executive Order 11990, Protection of Wetlands, directs Federal agencies to provide leadership in minimizing the destruction, loss or degradation of wetlands and to avoid to the extent possible the destruction or modification of wetlands whenever there is a practicable alternative. The Order applies to agencies involved in (1) acquiring, managing and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities affecting land use, including but not limited to water and related land resources planning.

Identical provisions of the two Orders require: (1) the head of an agency to avoid undertaking or providing assistance for most Federal actions unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm; (2) early public review for new construction proposals located in wetlands; and, (3) requests for new authorizations or appropriations from the Office of Management and Budget to indicate whether the proposed action is in accord with the Order.

The Wetlands Order differs from the Floodplains Order by specifically delineating the major factors agencies must consider when proposing an action located in a wetland area. The Order does not apply to private permits for activities involving wetlands on non-Federal land. It also pertains only to new construction undertaken in or affecting wetlands.

The review required by the Order is very comprehensive, and should have a wide application to many environmentally-damaging projects now undertaken by the Federal government on or near barrier islands. Although not as broad as the Floodplains Executive Order, it will require Federal agencies to seek all practicable alternatives to new construction in wetlands, and hence should significantly reduce dredge and fill operations, beach reconstruction and groin or seawall construction undertaken on the barrier islands.

Options:

1. Agency compliance with the Wetlands and Floodplains Executive Orders should be carefully monitored by the Council on Environmental Quality and the Water Resources Council.

2. Approval of Federal grants or loans should be denied for facilities which do not conform to the guidelines prepared by the WRC for the implementation of the Orders.

3. Authorize the WRC to issue implementing regulations under the Orders which ensure that Federal and Federally assisted proposals will not adversely affect, either directly or indirectly, floodplain and wetland values unless there is no feasible alternative and all possible planning is undertaken to mitigate any adverse impacts on those values.

Agencies and Programs Affected:

All agencies listed in Appendix A that administer a construction, grant, permit, loan, or licensing program which could impact on a barrier island will be affected by these options.

VII. Public Information and Education

Objective: Federal agencies should undertake an extensive public information and education effort to highlight resource values and hazards frequently encountered on barrier islands.

Discussion: Raising the public awareness and knowledge of barrier islands, their resources, and their inherent hazards is one way of providing protection for the barrier islands. Although much has been written about the natural hazards and dynamics of barrier islands, there is no coordinated system of making the information readily available to persons interested in buying or developing property on a barrier island. It can be anticipated that fewer people would be willing to risk life and limb or a significant personal investment, that could be destroyed by a storm or other natural process (such as erosion), if the facts about barrier islands were more widely known. Similarly, it can be anticipated that fewer people would seek Federal grant or loan assistance for homes or businesses on barrier islands for the same reasons.

Educating the public to the hazards of permanent human occupation of the islands is particularly timely and important because of the nearly 20-year hiatus in major storm activity along the southern and Mid-Atlantic coast.

The public should also be made aware of the wealth of the recreational and natural resource opportunities available to them on barrier islands and the importance of protecting these resources. Tempered with the information regarding the hazards of permanent buildings on barrier islands, it is crucial to the support of a change in Federal policy toward barrier islands for the public to understand the uniqueness and natural beauty of the islands. Then it will be easier for the public to acknowledge and support the necessity for protecting island values, and the importance of reducing the Federal subsidies in order to sustain the islands' natural values. With increased public knowledge provided by a comprehensive public information program including displays at existing parks and refuges, public service television, and informational brochures, greater public support could be anticipated for protecting irreplaceable historical landmarks and wildlife habitat, and for providing a greater degree of safety to life and property.

Emphasis should be placed on describing the natural forces that work on a barrier island and the different characteristics and variety of the islands. A more informed public could then also take steps to assure barrier island protection within local communities, counties, and States, as well as on a national scale.

The Interstate Land Sales Full Disclosure Act is essentially a "disclosure" statute which requires interstate land developers to register their subdivisions before offering or selling lots to prospective purchasers. The standards for disclosure have been established by the Congress and, through delegation, by regulations published by the Secretary. The disclosure requirements apply to subdivisions as such, without regard to where the land is geographically situated or, as may be the case in barrier island developments, to the inherent hazards of the location. The physical features of the land involved are pertinent only to the extent that those features are properly subject to disclosure with the object of protecting purchasers. For example, the mere fact that a subdivision is situated on a barrier island would not of itself necessarily be a proper subject of required disclosure, but the fact that there is no access by road to the island probably would.

Although there is a substantial amount of research completed and underway on barrier island dynamics and ecosystems, there still exists a need for developing an increased capability to collect, archive, analyze, interpret, and disseminate scientific and technical information on barrier islands to planners, scientists, governmental agencies, organizations, and other potential users. Expanded information for the general public is only a part of the challenge. Equally important is to make needed information available to decisionmakers and those who support or directly influence decisions.

Options:

1. Heritage Conservation and Recreation Service (HCRS) should continue to pursue widespread airplay of three public information spots by television stations along the East and Gulf Coasts. These programs, alerting people to the fragility of barrier islands, are being played by interested television stations; but more stations might use them if encouraged. This type of program should also be continued on a periodic basis, and expanded to public information newspaper and magazine articles and radio messages. HCRS should emphasize the natural and cultural heritage of the barrier islands and the protection afforded designated areas of the islands through the National Registry of Natural Landmarks and the National Register of Historic Places.

   HCRS should work to ensure extensive public distribution of a recently released public information booklet on the barrier islands. The booklet contains a great deal of information pertaining to the barrier islands. It discusses good and bad land management techniques, the hazards of development on barrier islands, the methods of protecting barrier islands, and the natural, historical, cultural, and recreational values found on barrier islands. National and local environmental organizations should be informed of its availability, but copies should also be made available to the public in Federal, State, and local government buildings.

2. Fish and Wildlife Service and National Park Service should develop public information and interpretive programs for each of their respective barrier island holdings. These programs should describe, among other topics, the natural values and processes of barrier islands, the animals dependent on barrier islands for their survival, and the benefits of wise land management practices and use on barrier islands. These National Seashore and Refuge areas are governed by area management plans, which should consider public information an integral part of every plan.

   For example, the NPS has enacted a new land management policy (discussed on page 7) of which the public should be informed. This policy discourages further attempts to restrain the natural processes of erosion, deposition, dune formation, and inlet formation although some exceptions may be made when it may be necessary to manipulate the system in order to restore a more natural sedimentary regime. Each situation will be decided on a case by case basis. The policy further states that National

Seashores should be managed to phase out, relocate, or provide alternative developments to facilities located in hazardous coastal areas. New facilities will not be placed in areas subject to flood or wave erosion unless it can be demonstrated that they are essential to meet the management objectives, that no alternative locations are available, and that the facilities will be reasonably assured of surviving during their planned lifespan without the need of shoreline control measures. Providing for wide public distribution of this management policy will underscore the damages of barrier island development and will set an example of good planning principles based upon working with nature.

Also, the Fish and Wildlife Service is responsible for the inventory and list of rare and endangered species of both plants and animals and delineates areas of critical habitat for those species. The FWS should include in their public education and information program the value of the barrier islands to the rare and endangered species they sustain, as well as the role islands play in supporting sport and commercial fisheries which receive protection from National Wildlife Refuges.

3. The Federal Emergency Management Agency (FEMA), composed of the Federal Disaster Assistance Administration and the Federal Insurance Administration, should undertake a public awareness program to inform the public about the dangers and the costs of residing on the barrier islands. The critical issues to be emphasized are the hazards inherent with living on an island--damage to property, inadequate escape routes, constantly changing landscape, land too unstable for building, and the risk to life. Such a program, directed to increasing public awareness and education about all aspects of barrier islands could be the cornerstone on which to build a barrier island protection program supported by the citizenry of the country. Booklets should be distributed to institutions such as banks and savings and loan associations, which should be encouraged to distribute information to individuals applying for loans or flood insurance.

4. The Office of Coastal Zone Management (OCZM) should encourage States to use their coastal management programs to provide information to the public generally and developers in particular about the risks and problems associated with development on barrier islands. Funds should be available to States under Section 306 implementation grants for this purpose, and a "model" booklet should be developed by OCZM.

5. The Office of Interstate Land Sales (DHUD) should require developers of barrier island properties to be explicit about the hazardous nature of barrier island occupancy. Developers on barrier islands should be directed to specifically inform potential buyers of the hazards and potential costs of living on the islands.

6. The Department of the Interior should, in cooperation with other Federal agencies, the states, and private organizations, develop the capability for acquiring archiving, analyzing, and disseminating information on barrier island environments. Particular emphasis should be placed on increasing the sensitivity of planners and developers to the unique limitations barrier island environments place on many human uses, bringing the latest research findings to bear on governmental decisionmaking, and improving the awareness of the general public.

Agencies and Programs Affected:

1. Heritage Conservation and Recreation Service
2. Fish and Wildlife Service
3. National Park Service
4. The Federal Emergency Management Agency
5. The Office of Coastal Zone Management
6. The Office of Interstate Land Sales

VIII. Acquisition

Objective: To emphasize acquisition of barrier islands through existing Federal programs and to encourage application of appropriate less-than-fee acquisition methods when feasible.

Discussion:
The national seashores and recreation areas that are situated on barrier islands were created individually through separate Acts of Congress. Each Act specifies the purposes for which the unit was established, identifies the general boundaries, sets out basic management guidelines, and establishes the authorities governing the Secretary's right to acquire land by various means. Since 1965, the Land and Water Conservation Fund (LWCF) has been the primary source of land acquisition funds for the NPS.

Wildlife refuges are acquired under a number of authorizations including site specific and species specific Acts of Congress. The Migratory Bird Conservation Act of 1929 provided the first unified land acquisition program for waterfowl refuges. The Act has been implemented with funds derived from the Migratory Bird Hunting Stamp Act and the Wetlands Loan Act. The LWCF and the Endangered Species Act both broadened acquisition authorities and increased potential funding levels.

Generally, the entire fee simple title of lands acquired by the Federal government has been purchased. However, donations of land also have played an important role in the acquisitions for both national seashores and refuges.

Because land acquisition is a long-term commitment of dollar and manpower resources for protection and management, less-than-fee mechanisms are being given greater consideration by the Federal agencies, especially by the FWS. In an August 1977 policy paper, the basic FWS policy was stated as being "to acquire land only when other means of achieving program goals and objectives are no longer available and/or effective."

Many of the national units contain private inholdings or private lands that are immediately adjacent to the Federal boundaries. Especially in NPS areas, development of the private lands ranges from dispersed residences to whole communities of several thousand structures. The adverse use of private inholdings is considered a particularly serious long-term problem because acquisition money to eliminate existing adversities is sometimes unavailable. The future use of peripheral lands also poses a great potential threat to the integrity of Federal units, especially where these lands consist of private communities located on the same island as the Federal unit.

Particularly in undeveloped rural areas, local development controls frequently are inadequate to ensure compatibility of private land development with barrier island resources in general and the protection of an adjacent publicly owned unit in particular. If developed intensively for residential and commercial uses, adjacent lands can seriously impair the quality of the natural environment--through groundwater pollution, surface water pollution, impairment of wildlife habitat values, and related ecological effects--as well as the quality of the visitor's experience--through traffic congestion, impairment of visual quality, and degradation of the inspirational value of the barrier island. If shoreline stabilization measures are implemented to protect developed areas from erosion, destabilization of the sediment balance of nearby public lands is a probable result.

GSA is responsible for disposal of Federal surplus property. When GSA disposes of a surplus property, not all future development plans may be known to GSA at the time of the disposal action. Unanticipated uses could occur with the subsequent sale or transfer of title to real property which might involve increased development or densities on barrier islands.

Cities, counties, and States also may acquire Federal surplus property for parks, recreation, economic development (commercial and industrial), and numerous other uses. Although many surplus properties are converted to recreation or wildlife purposes by Federal, State or local governments, many also are assigned to the Department of Health, Education, and Welfare (DHEW) for conveyance to local governments for public health or educational purposes. As with most other Federal agencies, GSA does not differentiate between barrier islands or mainland in administration of its programs. However, various controls are placed on property through the determination by GSA of the most desirable uses, and in the case of historic properties, restrictions are frequently added to the deed which will insure proper use and preservation of the property.

Two other Federal agency acquisition programs that could provide a measure of protection to specific barrier island areas have been authorized by Congress. However, neither of these has been funded.

The first is a program administered by the Office of Coastal Zone Management to assist States in purchasing access to beaches and other coastal areas (Section 315(2)).

The other is administered by the Federal Insurance Administration and is to assist communities in acquiring properties in flood prone areas once they are damaged substantially beyond repair by a flood (Section 1362). In addition to having not been funded, no specific delegation of responsibility has been made for this section.

Options:

The National Park Service and the Fish and Wildlife Service should:

1. As a means of managing and regulating inholdings, develop cooperative agreements and other authorities with local governments to promote compatible development and use of peripheral lands. Searching for common points of concern and interest in leaving certain areas for open space, to promote the wisest use of resources in watershed areas for example, should result in better land use practices on a regional and area basis.

2. Dependent upon existing authorities, purchase or seek donations of scenic and open space easements on adjacent lands wherever it is economically and programmatically practical. Although these easements sometimes may cost almost as much as fee simple acquisition, significant long-range savings to the Federal Government and to local government tax collections may result because the land is not removed from tax rolls, and the Federal Government does not become directly responsible for its management.

3. Dependent upon existing authorities, consider purchasing certain adjacent lands in the marketplace and later resell such lands with deed restrictions permanently limiting the type of activity that can occur. It may be legally necessary for one Federal Government agency to deed enforcement of a restriction like this, for example an open space or scenic easement, to another Federal agency to avoid having it considered an unreasonable restraint on the alienation of land. If it is deemed necessary to get legislative authority for such activities, then legislative authority should be sought.

4. Consider restricting issuance of special-use permits and rights-of-way to inholders, adjacent land owners, or State and local governments for activities on Federal lands such as refuges and seashores. See the discussion under "Permits" in the moderate level alternative section.

5. The Office of Coastal Zone Management should analyze the merits of implementing Section 315(2) of the Coastal Zone Management Act which would provide funds for States (on a 50% matching basis) to acquire shorefront access and islands. If Section 315(2) is implemented, OCZM should consider earmarking a substantial proportion of these funds for protecting and preserving barrier islands through innovative techniques which could include less-than-fee simple acquisition.

6. The Office of Coastal Zone Management should revise its estuarine sanctuary regulations to give high priority to the inclusion of portions or all of a barrier island as part of an estuarine sanctuary.

7. The Federal Insurance Administration (FIA) should be delegated the authority created under Section 1362 of the National Flood Insurance Act of 1968 to assist communities in acquisition of flood prone areas. If Section 1362 is implemented, FIA should consider acquiring barrier island properties located in a flood risk area which are covered by the flood insurance program and are damaged beyond reasonable repair. These properties could then be transferred, leased, sold, or donated to public agencies which agree to use the properties for conservation or recreation purposes.

8. HCRS should encourage contributions of barrier island properties by the private sector to public agencies and work to ensure that private groups continue to have an active role in future barrier island protection efforts.

9. The General Services Administration should consider limiting the disposal of Federal surplus properties on barrier islands for recreation, conservation, and open space purposes and of incorporating reverter provisions in leases and deeds of sale on Federal surplus transfers to restrict changes in use patterns and densities.

Agencies and Programs Affected:

National Park Service

Fish and Wildlife Service

Office of Coastal Zone Management

Federal Insurance Administration

General Services Administration

High-level Protection Alternative

I. Development Project Evaluation

Objective: Restrict Federal government initiated or assisted development projects on barrier islands unless they can be shown to be in the national interest.

Discussion: "Many [barrier islands] are unstable and not suited for development, yet in the past the Federal government has subsidized and insured new construction on them."[1] A question remains as to what degree the Federal government should reduce its involvement with barrier island development and redevelopment following severe storm damage. The environmental review process discussed in "Development Project Evaluation-Moderate" would ensure adequate agency analysis of the environmental impact of projects, but it would not place any prohibitions or restrictions on the type of project that should be approved.

It may be necessary to amend numerous authorities if prohibitions on certain types of actions are desired. For example, if a prohibition on new bridge permits to barrier islands was sought, a restriction on the Coast Guard's general legislative authority to issue such permits would appear to be necessary. Likewise if Federal matching funds for sewage treatment plants were to be restricted for new barrier island developments, an amendment to the enabling legislation for EPA and SBA may be necessary.

Options:

1. Fish and Wildlife Service - Consider directing application of the Fish and Wildlife Coordination Act, 16 U.S.C. 661-667e, for all actions affecting barrier islands and other important ecosystems and landforms. Require Federal agencies to consult with the Department of the Interior in the initial planning stages of any agency action which may affect a barrier island. For an action which will affect an undeveloped barrier island, require the action agency to obtain the concurrence of the Secretary of the Interior that no reasonable and prudent alternative to the barrier island site exists, that any adverse impacts will be minimized, and that the action is in the national interest.

2. Department of Housing and Urban Development - Consider amending the Interstate Land Sales Full Disclosure Act, as it applies to barrier island development, to:

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[1] President Carter, May 1977 Environmental Message.

a. lower the current threshold for registration requirement from 50 lots to five lots and require construction to be in accord with acceptable barrier island building codes and zoning.

b. prohibit from interstate commerce sales of barrier island lots or developments that adversely impact on areas of vital concern, which are defined as: wetlands, dunes and beaches, acquifer recharge areas, habitats of endangered species of plants and animals, and areas of extreme storm hazard.

3. All Federal Development Programs - Consider amending, as necessary, and appropriate, Federal agency authorities to prohibit the approval of Federal grants, loans, or permits for a barrier island project unless it meets, as a minimum, a three-part test for each requested project. Under this option documentation necessary to show that all feasible alternatives to the project had been considered should be required. Project approval should be granted only when no alternative was feasible, an overriding national interest clearly could be shown, and all possible mitigating measures were agreed to.

   The tests should be applied with increasing severity on the basis of the importance of the natural resource values remaining and the extent to which the island is undeveloped. The test should verify that:

   a. there are no feasible or prudent alternatives;

   b. Federal participation in the project is essential; and

   c. the proposal ensures that harm to the island's resources would be minized and all possible planning is undertaken to mitigate any adverse impacts on the island's natural values.

   This amendment should also:

   -- provide for suitable properties to be acquired and used for public open space and recreational purposes; and

   -- provide for the use of relocation assistance funds for individuals and businesses displaced by such actions.

4. Consider amending the appropriate Federal agency authorities for development oriented grant and loan programs which have passed the three-point test proposed in paragraph #3 above, to change match ratios from current levels which tend to promote development at the expense of the general taxpayer (more than 50% Federal share) to a ratio which internalizes a greater share of the costs to the direct beneficiaries (less than 50% Federal share) of such projects.

Agencies and Programs Affected:

1. Department of the Interior

best copy available

--Heritage Conservation and Recreation Service - the Land and Water Conservation Fund

--Fish and Wildlife Service - Fish and Wildlife Coordination Act

. Department of Housing and Urban Development

--Community Block Grant Program

--Office of Interstate Land Sales - Interstate Land Sales Full Disclosure Act

. Small Business Administration - grants and loans

. Economic Development Administration - grants and loans

. Government Services Administration - grants and loans

. Farmers Home Administration - grants and loans

. U.S. Army Corps of Engineers - coastal protection works; dredge and fill permits

. Federal Emergency Management Agency - reconstruction, restoration

. Department of Energy - facility siting.

0. Department of Transportation/U.S. Coast Guard - bridge permits

1. Department of Agriculture/Rural Electrification Administration - installation and upgrading of electric utility lines.

I. Flood Insurance

Objective: The purpose of these options is to encourage FIA to give higher priority to barrier islands than to other flood-prone areas in implementing its authorities and responsibilities which have barrier island application.

Discussion: High winds, waves, scour, erosion, subsidence, rising sea level, and other forces combine to make barrier island flood hazards potentially much more severe than riverine floods. These hazards and the threats they pose to human life and property should be recognized and reflected in the administration of publicly subsidized flood insurance programs.

Options:

1. FEMA should consider exercising its authority under the National Flood Insurance Program to:

   a. prepare flood insurance rate maps for all barrier islands;
   b. designate all appropriate barrier island areas as "coastal high hazard areas"; and
   c. develop erosion setbacks to ensure that new construction is not undermined during the term of federally insured mortage.

2. Consider amending the Flood Disaster Protection Act to deny federally subsidized flood insurance for new construction in areas designated by FIA as "coastal high hazard areas" or which are seaward of the erosion setback line.

Agency and Programs Affected

Same as for moderate alternative options.

III. Disaster Mitigation and Recovery

Objective: To encourage the consideration of barrier island values and hazards in the administration of Federal disaster assistance programs.

Discussion: Existing legislation authorizes or permits a wide range of activities to mitigate losses, which are caused by major disasters, to individuals and businesses on barrier islands. Grants and loans are expeditiously provided for reconstruction or restoration of facilities to pre-storm conditions; areas are cleared of debris; and utilities restored to working condition.

The options presented herein would establish mechanisms for identifying and delineating areas and types of facilities in coastal high hazard zones which, when severely damaged by storms, would not be eligible for Federal assistance to reconstruct or restore in the same location. However, relocation assistance would be provided to help individuals and businesses electing to move rather than rebuild in the high hazard areas.

Options: Consider amending the:

1. Flood Disaster Protection Act to restrict disaster assistance from being used for reconstruction in coastal high hazard areas and to provide relocation assistance for businesses and residents who voluntarily elect to move to safer areas.

2. Disaster Relief Act of 1974 to:

   a. require disaster preparedness plans and programs to include specifications and standards for determining the areas where, and conditions under which, development would or would not be allowed. (Section 201) Condition post-disaster recovery assistance on the inclusion of such standards and specifications in the State's plan.

b. prohibit the reconstruction of any Federal facility on a barrier island that is substantially damaged by a storm unless there are no prudent or feasible alternatives to reconstructing the facility on the barrier island site and that the facility: (1) is required for public health or safety; (2) is related to the enhancement of fish and wildlife values or provides public recreation opportunities; and (3) will not adversely affect the natural values on the island. (Section 401)

c. authorize the establishment of Recovery Planning Councils prior to a major disaster to assist in developing and gaining approval of pre-disaster contingency plans for barrier islands. (Title VIII)

Agency and Programs Affected:

FEMA - Flood Disaster Protection Act

Disaster Relief Act of 1974

IV. Resource Evaluation and Planning

Objective:To provide mechanisms for identifying, classifying and planning the protection of barrier island values.

Discussion:
Federal barrier island programs and policies currently are unfocused and uncoordinated, and frequently in conflict with one another. Identification and evaluation of barrier island resource values is an important first step in providing consistent protection policies for those values.

The options presented herein would provide a foundation for establishing a framework to provide more effective protection for barrier islands by: designating a Federal focal point in the Department of the Interior for monitoring and coordinating the myriad of Federal programs impacting the islands; strengthen the communications network among the various levels of government; and developing a system of priorities for action.

The Coastal Zone Management Act provides for a voluntary program; there are no sanctions imposed upon any State or territory which chooses to participate. The Act emphasizes the lead roles of State and local governments. Direct State administration, local administration consistent with State-established standards, and local administration subject to State review are the three optional means of program implementation specifically mentioned in the Act. The federal role is basically limited to providing the States with financial and technical assistance during development and implementation of management programs. The Act does provide guidance on the basic framework for State programs and requires participating States to address the following nine points:

1. Identification of boundaries of the coastal zone (determined by State discretion with minimum limits specified in the Act);

2. Designation and inventory of areas of particular concern (these may be areas of economic as well as environmental importance);

3. Broad guidelines on priority of uses in particular coastal areas including specifically those uses of lowest priority;

4. A determination of permissible land and water uses which have a direct and significant impact on coastal waters;

5. The means by which the State proposes to control those uses (this refers to the implementation authorities the State will use in making its program work);

6. The organizational structure which would implement the management program;

7. A planning process for shoreline erosion;

8. A planning process to deal with the issue of access to public waterfronts; and

9. A planning process for the siting of energy facilities.

Section 211 of Public Law 94-579, the Bureau of Land Management's "Organic Act", authorizes the Secretary of the Interior to convey, under the provisions of the Recreation and Public Purposes Act, 43 U.S.C. 869 et seq., to States and their political subdivisions any unsurveyed islands determined to be federal lands of the United States.

The Act also amends the Recreation and Public Purposes Act to require the Secretary to determine that any lands conveyed are not of national significance and that, for parcels of over 640 acres in size, comprehensive land use plans and zoning regulations applicable to the area in which the conveyed lands are located have been adopted by the appropriate State or local authority.

Options: Consideration should be given to:

1. Placing high priority on gaining enactment of the National Heritage Policy Act of 1979.

2. Establishing within the Department of the Interior a barrier island action coordinator to ensure that national policies impacting barrier islands are implemented in a clear coordinated manner by all Federal agencies.

3. Directing the Secretary of the Interior, in consultation with the Secretary of Commerce, to further refine a priority listing of presently undeveloped and unprotected barrier islands for potential acquisition. Further direct all Interior agencies, in particular the National Park Service, the Fish and Wildlife Service and the Heritage Conservation and Recreation Service, as well as OCZM (in its allocation of Section 315(2) funds), to use this list as a guide for acquisition of valuable and threatened barrier islands in the next five years. This list should take into account potential threats to the continued integrity of these islands and gaps in existing Federal land holdings that are also threatened in the near future by irreversible degradation.

4. Amending the Coastal Zone Management Act to assure State designation of all undeveloped barrier islands as "areas for preservation" for which State programs must provide appropriate management and protection. Define "permissable uses" as those which are dependent on a barrier island location, are consistent with long-term conservation of the barrier island values and are designed to minimize adverse impacts. As part of this amendment, standards should be included to assure that any facility planning, siting or development fully considers the fragile nature of barrier islands and avoids, to the extent practicable, any disruption of the natural processes upon which survival of barrier islands is so dependent.

5. Amending the Coastal Zone Management Act to require that a portion of the Federal financial assistance provided to States be used to improve their management and protection programs of coastal areas, including the barrier islands.

6. Amending Section 211 of the Federal Land Policy and Management Act of 1976 (P.L. 94-579) to condition conveyance by the Secretary of the Interior of any barrier island property to any political subdivision on: (a) a determination as to whether the island requires surveying; (b) an analysis of the "scientific, scenic, historical, ecological, environmental, air atmospheric, water resource, and archeological values" (Section 102(a)(8)); and (c) a plan of utilization compatible with conservation of the resource prepared by the potential recipient and approved by the Secretary.

Agency and Programs Affected:

Same as moderate level but including:

Bureau of Land Management - Federal Land Policy and Management Act of 1976, P.L. 94-579; 43 U.S.C. 1701

V. Permit Process

Objective: Restrict approval of Federal permits and rights-of-way for development on barrier islands.

Discussion: Various permits for activities on barrier islands can have harmful consequences. It is essential that approval of permit applications be based on a thorough analysis of alternatives and barrier island specific impacts. Specific criteria and standards for approval should be established and strictly adhered to.

Option:

1. Consider amending the authorities for development-oriented programs to prohibit the approval of any Federal right-of-way or permit for a barrier island project unless it meets, as a minimum, the three-part test described under option 3, Development Project Evaluation for the High Level Protection Alternative.

Agencies and Programs Affected:

1. U.S. Army Corps of Engineers - Section 404 Permits
2. U.S. Department of Transportation

   U.S. Coast Guard - Bridge Permits

   Federal Highway Administration - Wetland Policy
3. U.S. Department of the Interior - Rights-of-way policy.

VI. Executive Orders 11988 and 11990

Objective: Place emphasis on the barrier island flood plains and assure a consistent and comprehensive implementation of the two Orders.

Discussion: The very nature of barrier islands makes them more vulnerable than the rest of the coastal floodplain to storms and hurricanes and the flooding that often accompanies them. Barrier Islands not only lie within the coastal floodplain but also protect the shoreline from the full severity of coastal storms and flooding. They not only are inundated by floodwaters during storms but also can lose whole sections of land as new inlets are formed by stormy seas.

For the barrier islands, almost all wetlands are located in floodplains. This means that, in most cases, Federal actions proposed in wetlands would have to comply with agency procedures developed in response to both the Wetland and Floodplain Executive Orders. Confusion could be created while the agency determines whether one or the other or both Orders applied. Two sets of procedures also create a situation where a developer could manipulate one set of regulations against the other to his benefit and the detriment of the purposes of the two Executive Orders. Also, actions in floodplains that are not actually located in a wetland will still often impact on the wetland.

Options:

1. The Water Resources Council should be requested to consider elevating the importance of barrier island floodplains in, and through, the Floodplain Executive Order; these floodplains should be considered a more critical and unstable resource than floodplains located on the mainland.

2. The WRC should consider preparing a common set of procedures which integrate the provisions of the Floodplains Executive Order and the Wetlands Executive Order to the extent that it makes programmatic sense. Unified procedures would permit the full range of interdependent impacts to be considered completely and as a whole. Consequentially, a greater degree of protection for the barrier islands should result.

3. Consideration should be given to assigning oversight authority to the WRC to assure compliance with the two Executive Orders, to provide for careful scrutiny of development proposals impacting upon barrier islands, and to preclude development on large portions of many of the islands. Public hearings and written notice should assure a wide public involvement and would provide for a variety of views and concerns.

Agencies and Programs Affected:

All agencies listed in Appendix A that administer a construction, grant, permit, loan, or licensing program which could impact on a barrier island will be affected by these options.

VIII. Acquisition

Objective: Emphasize Federal and State acquisition of barrier islands and encourage donations of barrier island property by private land owners.

Discussion: The National Park Service currently is legally restricted from acquiring State and locally owned lands within or adjacent to its management boundaries except by donation and has limited authority for boundary adjustments due to congressionally mandated boundaries.

The first restriction is a potential management problem. Eight National Park Service areas contain substantial acreages of non-Federal public lands which can be acquired only by donation or exchange. As of 12/31/76, the total acreage involved was about 120,600. Most of this acreage is submerged land administered by the States and likely to be transferred to the Federal government in the future. Five areas contain State parks and one contains municipal and county parks on the barrier island itself. These parks are not likely to be transferred while there is a reasonable likelihood that Federal administration would result in a reduction in use.

Consideration should be given to authorizing Federal purchases of State or local lands where there is a reasonable liklihood of conflicts that would seriously compromise Federal land management objectives. Such authorization would give valuable flexibility to Federal land managers.

The second restriction, the prohibition on acquisition of private lands as a means of adjusting boundaries should be more flexible as applied to barrier islands. Acquisition authority to adjust established boundaries could be restricted and deferred until major storm damage occurred. An exception should be made for serious non-conforming properties which would be acquired immediately through condemnation. However, following major storm damage and after property owners had been compensated for seriously flood-damaged improvements, the Department of the Interior should be able to acquire adjacent private lands at the fair market value of unimproved property. Undamaged property, if incompatibly used, could be acquired either on an opportunity purchase basis or by condemnation. This modification has the advantage of achieving limited land use control while deferring land acquisition to a future date. It also prevents rebuilding after a disaster and facilitates the acquisition of land at prices lower than would otherwise be possible.

It is difficult for the Federal government to encourage States to buy barrier islands. This may be due in part to the difficulties of access which also are reflected in the high costs of development and administration. One way to encourage them would be to amend the Land and Water Conservation Fund to change the present match ratio of 50% Federal-50% project sponsor to 70% Federal-30% project sponsor for acquisitions proposed on barrier islands. An amendment would also be desirable to permit purchases of land under this authority even where the primary purpose is for conservation rather than recreation use. Such an amendment would probably succeed at encouraging greater State and local acquisition of barrier islands, but is open to the criticism that a more favorable match ratio should also be applied to other fragile resources or scenic areas of the country.

The authorization Congress provided in Section 315(2) of the Coastal Zone Management Act has never been implemented and it expires in 1980. The section has potential, if extended and funded, for providing protection to barrier islands.

Donation of private lands on barrier islands to public agencies, foundations, or conservation organizations has played an important role in protecting a substantial number of the islands. It can be anticipated that increased donation would occur if donations were made more beneficial or if development and speculation were made less profitable.

Options:

The National Park Service

1. If needed to achieve a unit's management objectives as defined and delineated through the planning process, consideration should be given to amending the specific National Seashore Acts which prohibit acquisition of State and local lands within established boundaries except by donation. Where management conflicts exist, the Secretary should be able to acquire those lands by other means including condemnation, when it is necessary to protect the natural values of the federally administered public lands. Authority to purchase land outside of established boundaries after disasters or where serious conflicts with private holdings exist should also be considered.

Heritage Conservation and Recreation Service

2. Consider amending the Land and Water Conservation Fund Act of 1965, as amended (16 U.S.C. 460e-4 through 460e-11) to change the currently imposed match ratio of 50% Federal - 50% project sponsor to a 70% Federal - 30% project sponsor for any State or locally proposed barrier island acquisition even though the primary purpose of the proposed acquisition is conservation rather than recreation related.
3. If it is determined that a problem exists due to insufficient funds or inflexibility in the Federal portion of the Land and Water Conservation Fund to finance needed barrier island acquisitions, consideration should be given to establishing a Barrier Island Trust Fund. Using some of the funds received from Outer Continental Shelf leasing in excess of that appropriated to LWCF, islands should be purchased using less-than-fee simple acquisition wherever possible.

Office of Coastal Zone Management

4. Consider extending Section 315(2) of the Coastal Zone Management Act when it expires in 1980.

5. **Department of Treasury and HCRS**

Jointly consider the development of a comprehensive conservation tax law which, among other things, would:

a. increase tax benefits for charitable gifts of easements, deed restrictions, or other types of donations which would provide protection for barrier islands.

b. discourage speculation and development of barrier islands by imposing a speculation tax, increasing taxes on capital gains realized on barrier island property transactions, and prohibiting claims of accelerated depreciation of barrier island properties.

Agencies and Programs Affected:

1. **The National Park Service - National Seashore Acts.**

2. **Heritage Conservation and Recreation Service - The Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 460e-4 through 460e-11**

3. **Office of Coastal Zone Management - Section 315(2) of the Coastal Zone Management Act**

4. **Department of Treasury**

Note: The foregoing options are not recommendations nor do they in any way constitute administration policies. Many of these options will be further refined before final recommendations are developed.

II. ENVIRONMENTAL STATEMENT

AFFECTED ENVIRONMENT

A. The Islands - General Description[1]

The barrier islands are the most significant coastal feature of the U.S. East Coast from Maine to Texas. Only relatively short sections of the shore are without barrier islands. As a result, the U.S. has the longest and best evolved chain of barrier islands in the world. Although barrier beach structures exist on the West Coast, Alaska, and even in some of the Great Lakes, this discussion relates only to the East and Gulf Coast barriers.

Each island is an elongated, narrow landform consisting of unconsolidated and shifting sand. They are generally characterized by a dynamic beach system consisting of off-shore bars, crashing surf, and a sand beach, dune ridges just behind the beach, interior lowlands, and bay-side wetlands. They are separated from the mainland by marshes or open water intimately related to the island. Geologically speaking, they are quite young, having been formed within the last five or six thousand years. The barrier islands are so named because they protect lagoons, salt marshes, estuarine systems, and the mainland from the direct attack of ocean waves and storm surges. On one side, they face and absorb the full force and energy of the oceanic environment. On the other, they face calmer waters and stable shore that result from the physical barrier formed by the island itself.

The term "barrier island" in this report includes the barrier spits. Spits are attached to the mainland, with one end forming an attenuated peninsula. They can become barrier islands if a storm-caused inlet severs the peninsula from the mainland. Barrier islands and spits are considered as sub-categories of the overall geomorphic category called barrier beaches (Figure 1).

Barrier islands consist of several basic features (Figure 2). Although they may vary from place to place along the East Coast, the typical barrier island can be defined as including the following portions: that portion of the barrier which faces the ocean and meets the full force of waves on an hour to hour basis is called the berm; the sloping portion of the beach facing the ocean is the foreshore; and that portion of the beach from the berm crest back toward dunes, marshes, and other features, is the backshore. The berm is most directly affected by waves that occur both during storms and calm periods, and is therefore the most unstable portion of the barrier. The berm grades into dune zones, and, in fact, the berm itself may be the place on which dunes are likely

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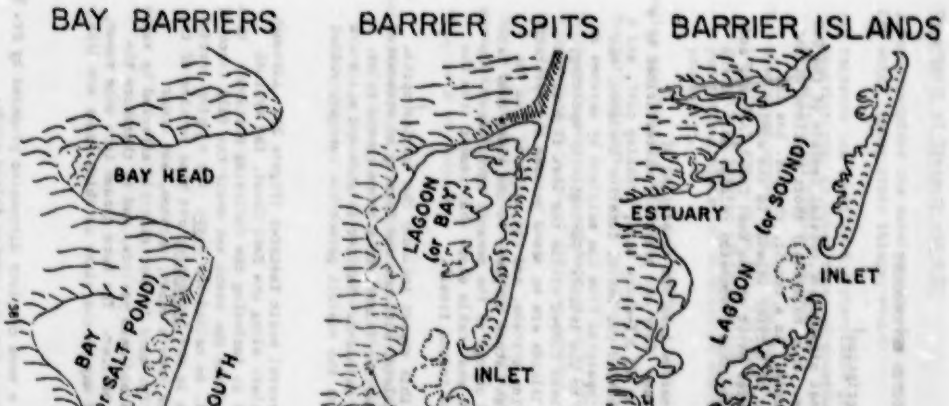
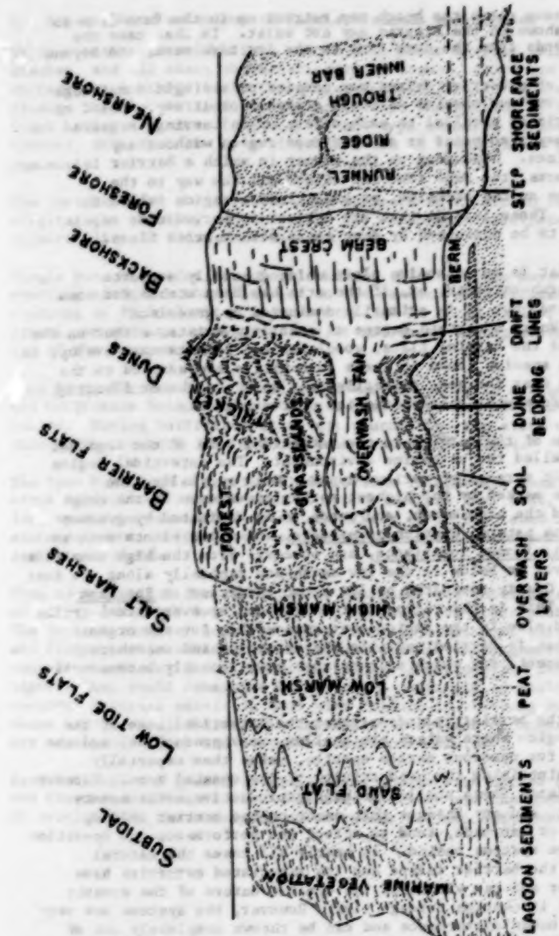
1/ This section is based on a more complete discussion prepared by Dr. Paul Godfrey and Dr. Steve Leatherman for the barrier island study.


BAY BARRIERS BARRIER SPITS BARRIER ISLANDS

BAY HEAD
BAY
(or SALT POND)
BAY MOUTH
LAGOON
(or BAY)
INLET
ESTUARY
LAGOON
(or SOUND)
INLET

BASIC TYPES OF BARRIER BEACHES
FIGURE, 1


NEARSHORE
FORESHORE
BACKSHORE
DUNES
BARRIER FLATS
SALT MARSHES
LOW TIDE FLATS
SUBTIDAL
INNER BAR
TROUGH
RIDGE
RUNNEL
BERM CREST
THICKET
GRASSLANDS
OVERWASH FAN
FOREST
HIGH MARSH
LOW MARSH
SAND FLAT
MARINE VEGETATION
SHOREFACE SEDIMENTS
STEP
BERM
DRIFT LINES
DUNE BEDDING
SOIL
OVERWASH LAYERS
PEAT
LAGOON SEDIMENTS
HST
HNT
MSL
LNT
LST

MODEL OF BARRIER BEACH
FIGURE 3

to form. In some cases the beach may retreat up to the dune line so that berm as shown in the diagram may not exist. In that case the foreshore extends from the dune line to the low tide mark, and beyond.

The dune zone of a barrier island may consist of a single dune ridge stabilized by various species of beach grasses, or it may consist of several dune ridges parallel to each other, or in curving, arcuate lines; or it may also occur as an open dune region without any distinctive lines. Depending on the manner in which a barrier island or spit system forms, the dune zone may extend all the way to the intertidal zone on the backside, or grade into a region called the barrier flat. Those islands that are subject to periodic or regular overwash tend to be dominated by dune zones with barrier flats.

The barrier flat is an extensive plain which generally supports grasslands, shrub-thickets, or, if the area has been stable for some time, a woodland; but it is primarily dominated by grassland communities. Where a certain degree of stability exists, either on the dune systems or the barrier flats, woodlands and forests can develop, in which case the species found in these communities are adapted to the rigors of life near the sea, primarily salt spray, seawater flooding, and other environmental characteristics of the region.

On the backside of the barrier is the intertidal zone of the lagoonal system, also called the estuarine environment. The intertidal region consists of salt marshes of various types. Most typically, the intertidal zone marked by the highest spring tides down to the neap tide, is called the high marsh, and tends to be dominated by grasses such as *Spartina patens*, *Distichlis spicata*, and other plants such as *Juncus gerardii*, *Juncus romerianus*, and others. From the high neap tide to mean sea level or below is the low marsh and typically along the East Coast and Gulf Coast, dominated by low marsh cordgrass or *Spartina alterniflora*. This is the region that is flooded by every tidal cycle of the day, and also is the region most responsible for the organic productivity that is carried out into the estuarine and nearshore oceanic environment, for which salt marshes have recently become well known.

The fact that the barrier islands protect the intertidal zone of the lagoon, that region where waters are shallow, very productive, and the nursery ground for numerous marine species, makes them especially important in maintaining the productivity of the coastal zone. Without the barrier islands these shallow or highly productive environments could not exist, and any changes that occur on the barrier island, either natural or man made, tend to affect the performance and operation of the estuarine systems behind. In nearly all cases the natural functioning of the barrier island and its associated estuaries have evolved together and can withstand the dynamic nature of the oceanic environment as it changes through time. However, the systems are very susceptible to human disturbance and can be thrown completely out of balance by development of barrier beaches, salt marshes, and other associated lands.

B. Topographic Variations of Barrier Islands and Beaches

While certain generalizations can be made about barrier islands and beaches, and all share characteristics in common, there are substantial differences in their basic topography (See Table 1). To a certain extent, these variations are regional, with one portion of the U.S. East Coast having a greater frequency of one type compared to another. However, more than one type of profile can be found within any given region.

The topography of the barriers also reflects to a certain extent, their origins, the existing conditions of the ocean/land interface, and their vulnerability to storm hazards.

Single Dune Ridge (or Dune Zone) barrier islands often have severe scarping along the shoreline and on the seaward dune ridges. Such scarping is typical after major storms and is often healed, to a certain extent, by aeolian deposition, and/or growth of beachgrasses along the toe of the scarped dune.

Dune Ridge-Barrier Plain barrier islands are prone to damage from storms and hurricanes because of the single dune ridge and low flat plains behind. During hurricanes it is not unusual for the storm to break through the seaward dune and overwash the entire island.

The Open Dune Zone - Barrier Plain barrier islands are usually found in areas subject to frequent oceanic storms and are low, flat, and have a low, open dune zone. The dunes are likely to be flattened in a major storm washover. Often, sediment supply is insufficient and shoreline retreat is rapid.

When sand supplies for the littoral processes are interrupted by jetties or groins, overwash barriers develop quickly from other stable types. The lack of sediment supply results in rapid erosion of existing dunes, and frequent overwashing. Even in environments which generally maintain overwash barriers, these disturbed beaches can erode and retreat more rapidly than would otherwise be the case. Attempts to stabilize washover barriers generally meet with failure in the long run. Whatever dunes may be created along the retreating shoreline by human activities are soon eroded away and overwash conditions return.

Such barriers are generally found along coasts with narrow tide ranges, and frequent storm activity. Washover barriers are the most hazardous to develop from the standpont of shoreline retreat and storm surges.

Table 1

Topographical Variations of Barrier Islands

Type	Characteristic Environment	Topography - Dune System	Organic Resources	Storm Recurrence	Islands
1. Coastal Plain Remnant ("Sea Island")	[illegible]	[illegible]	Similar to the mainland.	Relatively stable because of the extensive high ground protecting most of the island	Cumberland Island, Ga Sapelo Island, GA Hilton Head, SC Amelia Island, FL
2. Multiple Dune Ridges	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3. Multiple Dune Ridge with Alternating Wetlands	[illegible]	[illegible]	[illegible]	[illegible]	St. Phillips Island, SC
4. Single Dune Ridge or Dune Zone	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5. Dune Ridge - Barrier Plain	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] Merritt Island, FL Cape Canaveral, FL
6. Open Dune Zone Barrier Plain (Washover Barrier)	[illegible]	[illegible]		Dunes are likely to be flattened in a major storm.	[illegible]
7. Marshy Shore	[illegible]	Usually lacks sandy beaches or dunes.	[illegible]	[illegible]	[illegible]
8. Mangrove Islands	[illegible]	No beach or dunes. Mangroves build up "uplands" of roots.	[illegible]	[illegible]	[illegible]

They seem stable during quiet periods, and therefore give a false impression about their nature. One of the most recent urban areas created on a washover type barrier is Ocean City, Maryland.

Mangrove islands are coastal features which have been formed almost entirely by organic means and can be classified as barriers when they protect lagoons from direct wave action. Mangrove islands usually have no beaches or dunes, and are therefore highly susceptible to flooding. By their very nature, the mangrove islands are intertidal, much like the marshy shore. They develop when seeds of the red mangrove are trapped in the muddy sediments of the intertidal zone. The mangrove plant begins growth and as it does, prop roots are sent out into the mud. As the plant grows, others may start nearby, and soon a colony is produced. As the roots expand over the surface, muds and silts are trapped, and the elevation slowly increases. Over time, the red mangrove builds the substrate higher, and the site can then be colonized by the black mangrove. This species has roots which send aerial portions up from the substrate. As the elevation increases, a third mangrove, the white, can invade. When a mangrove colony is completely separated from the mangrove swamps along the mainland shore, they are classified as islands.

This continually changing relationship of ocean floor, surf line, and moving sediments produces islands that are both locationally and structurally unstable.

Approximately 300 study units consisting of all of the just described topographic variations have been identified. They are distributed unequally along the Atlantic and Gulf Coasts--ranging from two in several States to 80 in Florida. They also are equally diverse in size-ranging from 50 acres or less to well over 100,000 acres. Table 2 summarizes the study units by a number of different measures.

In addition to showing by State, total acres and acres by various management levels, the Table shows acres by three categories which reflect the relative State of protection or development. For purposes of this study, islands were categorized in the following manner:

1. Developed barrier islands are those with 75% or more of their land area developed, or with 1,000 or more acres of developed land area.
2. Undeveloped/unprotected barrier islands are those with no more than 10% of their land area developed, or with 5,000 or more acres of undeveloped land.
3. Protected barrier islands are those which are at least 50% owned and managed by a public agency, private group, or individual whose long-term intention is to maintain the natural conditions.

Those in public ownership (e.g., national seashores and wildlife refuges) are usually available for public recreational use, and usually have some administrative or public use facilities, ranging from simple campgrounds to elaborate overnight accommodations. These islands range

Table 2

Summary of Study Units by Various Categories

		Acres							
State	# of Islands	Total	Fed. Mgmt.	State Mgmt.	Other Public Mgmt.	Private Mgmt.	Developed	Protected	Undeveloped Unprotected
Alabama	5	28200	–	1200	100	26900	5200	1300	21700
Connecticut	14	2362	–	1417	215	730	678	1398	286
Delaware	2	10100	1000	2000	100	7000	2900	3100	4100
Florida	80	467710	212110	32900	7575	215125	103405	233735	130570
Georgia	15	165600	36100	44800	3100	81600	8700	71000	85900
Louisiana	18	41120	7600	1600	500	31420	3980	9650	27490
Maine	9	2640	60	710	110	1760	1640	760	240
Maryland	2	14300	9900	700	200	3500	2400	10500	1400
Mass.	27	37600	12875	2550	5025	17150	8390	19580	9630
Miss.	5	9500	6200	–	–	3300	200	6100	3200
New Hamp.	2	1100	–	200	200	700	700	100	300
New Jersey	10	48000	3800	3500	3500	37200	22700	9600	15700
New York	15	30310	2650	4400	5270	17990	11700	12260	6350
N.C.	23	146400	45400	12100	100	88800	23700	57100	65600
R. Island	6	3660	–	550	300	2810	1360	850	1450
S.C.	35	144150	11125	27350	100	105575	20525	38725	84900
Texas	16	383500	72600	39700	3000	268200	22850	120200	240450
Virginia	11	68900	17350	1400	10	50140	1350	28660	38890
TOTALS	295	1605152	438770	177077	29405	959900	242378	624618	738156

from virtually natural to quite altered environments. Those in non-public ownership are held by their owners (commonly non-profit conservation organizations) in some sort of permanent legal protection.

1. Origin of Barrier Islands and Spits

Barrier structures can develop in a number of different ways, and one type of formation is not necessarily more significant than others. The type of barrier island found in a given geographical region reflects the geological history of that particular region and the forces of sea level rise in a storm. (see Table 3)

Adding to the complexity of the whole system, many previous island systems may have eroded away or changed position by the forces of littoral drift. Shackleford Banks in Cape Lookout National Seashore is a classic spit type of island which apparently formed several thousand years ago as a spit attached to Cape Lookout, and has since been migrating westward. This island has a whole series of arcuate dune ridges, the oldest of which are in the middle portion of the island. Even so, the eastern end of the island now is undergoing a washover retreat as sand moves from one end to the other. The sequence by which a barrier beach develops from the growth of a spit is related to various sand transport mechanisms. As all processes of sand transport are involved in the creation, maintenance, and migration of the barrier island system, the islands may have moved a great deal since their initial formation, particularly islands such as those of the Outer Banks. While on the other hand, the barrier systems such as Cumberland Island and Sapelo Island, Georgia, may have moved very little. They also may have had barrier beaches further seaward than they now exist and these have migrated backward toward these coastal plain remnants. However the barrier island systems have formed, they have undoubtedly moved a fair amount, some more than others, and all represent the forces which have dominated the coastal region for the past several hundred years. (See Figure 3)

2. Inlets

Separating the individual islands of a barrier chain are tidal inlets; the deep, narrow channels through which the tide enters and leaves backbarrier lagoons.

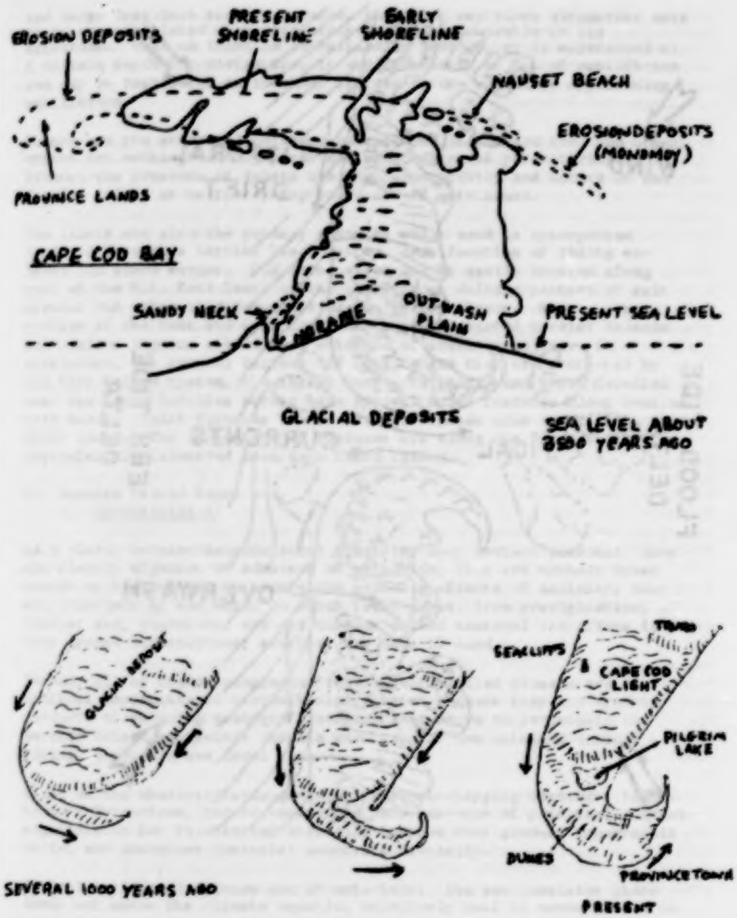
Naturally occurring inlets are the result of dynamic processes acting along the shoreline. They open and close in response to different conditions and may migrate long distances along a barrier island shoreline. While an inlet exists, a balance may be achieved between the tidal inflows and outflows which scour the channel and the longshore transport which tends to close the inlet. These factors approach equilibrium as the inlet cuts deeper or wider, builds shoals, or changes configuration or position. (See Figure 4)

When open, an inlet acts as a complete or partial barrier to the longshore transport of sand. Under the conditions of small tidal flows

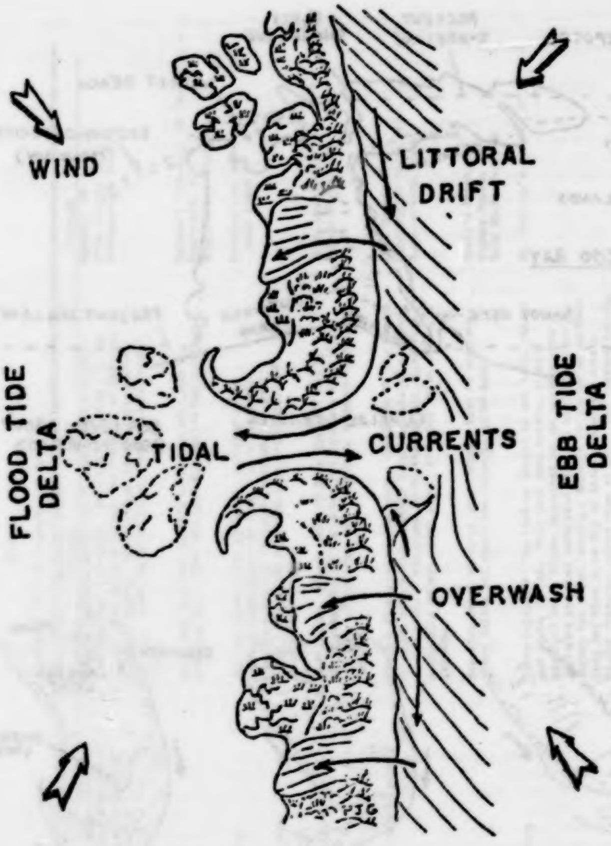
Table 3

Origin of Barrier Islands and Spits

Type	Process	Islands
Erosion of Glacial Deposits and the Subsequent Formation of Elongated Spits as a Result of Littoral Currents (See Figure 5)	Glacial deposits erode and elongated spits result from littoral currents. As a spit lengthens across either open water or along the front of an indented mainland region, the spit may become quite narrow. If it is breached by an inlet, then an island will form.	Monomoy, MA Fire Island, NY Northeastern Coast
	Spits may also end up with both ends attached to the mainland. Such barriers are called bay barriers.	Martha's Vineyard, MA (See Figure 5) Nantucket, MA Rhode Island shoreline
Drowned Beach Theory	The sea level rises along the mainland coast causing dune ridges to form. As a sea level continues to rise it breaks through the dune ridge, floods the mainland area behind it, and creates a lagoon.	Southeastern and Gulf Coast
Coastal Plain Remnants	Pleistocene uplands cut off from the mainland by the submergence of low areas and isolated form these islands. Often they have modern or Holocene barrier beaches.	Cumberland, GA Sapelo Island, GA
Barrier Islands formed by Rivers	Created from riverine sediments deposited at the mouths of major rivers that deposit large amounts of sediment in the ocean. The waves erode the deltaic deposits, especially as sea level rises, creating spits and islands.	Cape Romain Area Mississippi Delta Area Southeastern Coast
	Are also found at large river mouths that do not have river deltas but where the ocean is quite deep.	Small's Point, ME Popham Beach, ME Reid State Park, ME
Chenier-like Barriers	Often related to the various stages of sea level change and storm floods. They have long narrow, almost parallel beach ridges deposited on the marshes when storm surges push materials from the shoreline back across the marsh leaving a deposit on the marsh surface. Sand may blow in on top of these ridges and create higher features called dune ridges. Sea recedes leaving a series of beaches that will be submerged again when the sea rises.	St. Phillip's Island, SC


PRESENT SHORELINE
EARLY SHORELINE
EROSION DEPOSITS
NAUSET BEACH
EROSIONDEPOSITS (MONOMOY)
PROVINCE LANDS
CAPE COD BAY
SANDY NECK
MORAINE
OUTWASH PLAIN
PRESENT SEA LEVEL
GLACIAL DEPOSITS
SEA LEVEL ABOUT 3500 YEARS AGO
GLACIAL DEPOSIT
SEACLIFFS
TRURO
CAPE COD LIGHT
PILGRIM LAKE
DUNES
PROVINCETOWN
SEVERAL 1000 YEARS AGO
PRESENT

GEOLOGICAL FORMATION
OF CAPE COD
FIGURE. 3


WIND
LITTORAL DRIFT
FLOOD TIDE DELTA
TIDAL
CURRENTS
EBB TIDE DELTA
OVERWASH
PJG

Mechanisms Of Sand Transport On Barrier Beaches
Figure. 4

and large longshore transport rates, the inlet may close altogether only to be reopened later when conditions are again favorable to its existence. When an inlet is stabilized by jetties, or is maintained at a certain depth for navigation, it may constantly be out of equilibrium and may be restricted as to which factors it can adjust in approaching equilibrium.

Inlets are the essential pathways between the lagoon and the open ocean system for exchange of organisms and maintenance of productivity. Without the presence of inlets the high productivity and nature of the barrier island estuarine system could not be maintained.

The inlets are also the primary means by which sand is transported landward through a barrier beach system, as a function of rising sea level and storm surges. Old inlet sites can be easily located along most of the U.S. East Coast by the conspicuous deltaic pattern of salt marshes and other land forms behind the barrier beach. Nearly every portion of the East and Gulf Coast which has elongated barrier islands and shallow lagoons behind have evidence of previous inlets. In particular, the coastal regions off Long Island that are protected by the Fire Island system, the Jersey Coast, Virginia, and North Carolina near the South Carolina border have typical inlet features along most of this beach. Inlet features behind barrier beaches also exist along the Texas coast. The largest inlet features are along the Texas shore from approximately Galveston down into Padre Island.

C. Barrier Island Fauna

1. Terrestrial 1/

As a class, barrier islands stand apart for many obvious reasons: they are closely adjacent or adherent to mainlands; they are nowhere broad enough or high enough to escape the profound effects of salinity; they are underlain by sea water on which fresh water, from precipitation, floats; and, therefore, are apt to show marked seasonal variations in deep ground temperatures; and they are made of sand.

Indeed, all of the physiographic features of barrier islands are of critical importance to terrestrial organisms because they are dynamic products of on-going geologic processes that serve to perpetuate the barrier island ecosystems despite what is, for the mainland coastal plain, inundative sea level rise.

Three of the characteristic geologic features--capping barriers, inlet-hammock formations, and arc-and-spoke patterns--are of potentially great significance for terrestrial organisms because they produce topographic relief and therefore potential substrate diversity.

Several ecological factors are of note here: the sea insulates these lands and makes the climate equable, relatively cool in summer, warm in

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1/ This section on vertebrates is based almost totally on two papers by James D. Lazell, Jr., Massachusetts Audubon Society, Lincoln, Mass. 01773.

winter. This fact favors land animals that might be excluded by either temperature extreme. On the other hand, both ocean and precipitation temperatures directly affect the ground temperature within the land, causing summer warming and winter cooling far more extreme than on the mainland. These extremes can be limiting for ectothermic organisms and all those that hibernate or aestivate.

Because barrier islands have a number of major features of physical and chemical ecology in common, it is not surprising that they also share various land animals. In Table 4 are listed eight ubiquitous forms. Table 5 lists other widespread and characteristic barrier island forms. This list is not exhaustive; several species known from local populations, but not widespread on any system, have been omitted.

Several trends in this summary of deployment are apparent: mammals are a large proportion of the total diversity in the North, lizards become increasingly numerous in the South. Water snakes (*Natrix sipedon* complex) and mice (*Peromyscus*) are prone to rapid adaptive alterations everywhere.

Muskeget is one of the most peculiar and distinctive of all the Atlantic islands of North America, and it is tiny. It is well known for, among other things, its endemic vole.

Cottontails are now ubiquitous but gained access to the Massachusetts system after introduction to the adjacent mainland a few decades ago. Muskrats, so characteristic in Massachusetts, drop out south of Cape Hatteras and occur only on the western Gulf Islands. Native mice have undergone adaptive change on parts of all three systems: Monomoy, Massachusetts; Buxton Woods, North Carolina; and Alabama and Florida.

Toads are abundant on Massachusetts and North Carolina systems, but rare on the Mississippi Gulf Islands; all populations seem like their mainland relatives.

The snapping turtle and diamondback terrapin are standard species of the Atlantic littoral. Their presence in suitable marsh habitats on the barriers is unremarkable, except that it is worth noting the peculiar distribution of the terrapin at its northern terminus at Cape Cod. The hognose snake occurs in most places where toads, its principal prey, occur.

Size and distance are, perhaps, less relevant to barrier islands than some other measurable variables that result in ecological diversity. The islands and peninsulas are all low, similarly built of sediments in dune formations that, albeit fascinatingly different from system to system, are not materially different in the physiographic relief they produce. There is, admittedly, quite a marked variation in obvious

Table 4

Ubiquitous Barrier Island Mammals and Reptiles

Mammals:

Raccoon, Procyon lotor (G)
Cottontails, Sylvilagus ssp.
Native Mice, Peromyscus ssp. (C,B,G)

Reptiles:

Hognose snake, Heterodon platyrhinos
Racer, Coluber constrictor (B)
Water snake, Natrix sipedon-fasciata complex (C,B,G)
Terrapin, Malaclemys terrapin
Snapping turtle, Chelydra Serpentina

Note: In some areas evolutionary adaptation is highly visible. These are indicated as follows: C=Cape Cod; B=Outer Banks, North Carolina; G=Gulf Islands between Florida and Louisiana.

Table 5

Mammals and Reptiles of Cape Cod Region, North Carolina Banks, and Gulf Island Barriers

CAPE	BANKS	GULF
Vole*	-	-
Muskrat	Muskrat	?
-	Rice Rat	Rice Rat
Mink	Mink	?
Otter	Otter	?
Harbor Seal	-	-
Gray Seal	-	-
-	(Alligator)	Alligator
-	Mud Turtle	Mud Turtle
-	Slider	Slider
-	-	-
Garter Snake*	-	-
Ribbon Snake	(Ribbon Snake)	?
-	(Rat Snake)	Rat Snake*
-	Cottonmouth	Cottonmouth
-	Glass Lizard	?
-	Racerunner	Racerunner
-	SE Skink	SE Skink
-	(Anole)	Anole
-	Kingsnake*	Kingsnake
-	-	Whipsnake
Smooth Green	Kelled Green	?

NOTE: Asterisks indicate forms showing marked evolutionary departures at species, subspecies, or ecotypic levels. Parentheses are for rare or very local population.

"ecological diversity" between say, Shackleford and Core Banks, North Carolina. This obvious difference results from the different vegetative associations present. The land animals do indeed depend on the plants, at least to some extent. It seems apparent that those islands with greater "ecological diversity," i.e., more vegetative associations, i.e., more plant species, have more land animal species. The tautology is complete: islands with more species have more species.

Barrier island faunas are tenacious, resilient and highly evolved. Under natural conditions there is no turnover of species and no "equilibrium" of extinction and colonization. The number of species on any given island has to do with a plethora of factors beyond mere size and separation distance; mostly it has to do with the specific, unique and unpredictable attributes of each individual island and the autecology of each individual animal species. The number of species on an island, or anywhere else, can only be empirically determined.

Only man, with his dredges, bulldozers, jetties, groins, and livestock can so alter barrier islands as to exterminate their native faunas.

2. Marine Fauna [2]

a. Zooplankton

The shallow water immediately adjacent to a barrier island contains plankton populations typical of whatever part of the coast the island represents. At least some members of most major groups of sea animals spend all or part of their lives in the plankton. Although most plankters are small or microscopic, some quite large creatures may be classified in this category. The white jellyfish is abundant along the entire East Coast as are the pink jellyfish, a very large species common from Cape Cod northward, and the sea-nettle. The purple sailor and the dangerous Portuguese man-of-war, may be stranded on barrier beaches, especially in southern States. All these prey on smaller animals with the help of their stinging tentacles as do the ctenophores, another group with both large and small representatives.

The crustacean holoplankton is dominated by animals which feed on phytoplankton and are very important in the nutrition of larger organisms, including many commercially important fishes. Several cosmopolitan arrow-worms are conspicuous in the shallow water holoplankton.

Animals spending only part of their lives, usually the early part, in the plankton comprise the meroplankton. Most of these larvae are quite unlike their parents and must undergo drastic metamorphoses before they attain the adult form. Mortality is enormous, but so is the fecundity of the parental stock. Fish may be present in the meroplankton as floating eggs or as larvae.

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[2] This section is based on a more complete discussion, prepared by Dr. Melinda Godfrey, for the barrier island study.

b. Nekton

Strongly swimming organisms in waters surrounding barrier islands include fishes, mammals, and turtles. Shallow waters protected by barrier structures are usually teeming with juvenile fishes of many species as well as adult fishes of commercial and recreational importance.

Small cetaceans are the most prominent marine mammals to associate themselves with barrier structures. Two common porpoises, the Atlantic bottlenose dolphin and the Atlantic harbor porpoise, are frequently seen in sounds and estuaries. The blackfish swims in schools in coastal waters and strands rather regularly on beaches.

In Table 5, the harbor seal is listed for the Massachusetts system only because it actually breeds there; it winters south to the Outer Banks. The grey seal, the largest carnivore of the eastern United States, has its only U.S. breeding population, the southern-most in the world, at Muskeget, Massachusetts. The shallow waters behind barrier structures are a habitat for the manatee, also found in rivers and estuaries, primarily in Florida but occasionally north to North Carolina and west to the Texas coast. Unlike the carnivorous seals and cetaceans, the manatee lives entirely on aquatic vegetation.

Five species of sea turtles include the Atlantic and Gulf Coasts within their ranges. The loggerhead may stray north as far as Newfoundland. It nests on beaches, often barrier beaches, as far north as North Carolina and occasionally to New Jersey. As with other sea turtles, only the females ever come ashore and then only to bury their eggs in the sand.

Young Atlantic ridleys may often be seen along the Atlantic Coast, but nesting occurs only in Mexico and southern Texas.

Two species that are presently very rare are the green turtle and the hawksbill. Both are occasionally found in shallow coastal water as far north as Massachusetts. Green turtles once nested on Florida and Gulf beaches, but now do so only in the Caribbean.

The Atlantic leatherback is the world's largest living reptile. It is a turtle of warm waters, nesting occasionally on Florida beaches, but it migrates north in summer, feeding on cold water jellyfishes. Leatherbacks stay mostly in the open sea, but occasionally may enter coastal waters.

c. Interstitial Fauna

Possibly the most ignored coastal community is that of the tiny plants and animals that live in the spaces between sand grains, above and below the low tide mark. A seemingly barren expanse of sand actually harbors huge numbers of these animals which exist as primary consumers, detritivores or predators. Although most people are not even aware of their existence, they have an important role in the recycling of organic matter in the coastal zone.

d. Benthos

Barrier structures consist of unconsolidated material and, therefore, most of their associated benthos is that of soft bottoms. Solid substrate fauna appears on rocks and on man-made objects such as groins, jetties, seawalls, pilings, and derelict vessels and automobiles. Salt marshes and seagrass fields harbor specialized communities of their own.

Benthic organisms may be infaunal or epifaunal. Infaunal animals may burrow actively through the substrate or occupy more or less fixed tubes or burrows. Epifaunal animals either attach themselves to objects (sponges, anemones, etc.) or they crawl about on the surface (crabs). Many of the fish mentioned in connection with the nekton are ecologically part of benthic communities, since they feed and often rest on the bottom.

Many benthic animals are detritus feeders; that is, they are nourished by bacterial protoplasm from the surfaces of decomposing organic matter. Detritus feeders return nutrients to the interface and water column that would otherwise be buried by sedimentation, and thus they counteract some of the effects of accelerated sedimentation due to man.

(1) Soft Bottom Communities

Most of the waters immediately surrounding barrier structures are underlain by unconsolidated sediments. In high energy zones such as open beaches and the margins of inlets, this type of bottom is continually being stirred and shifted, and consequently only a few specialized forms can exist here. At the other end of the energy spectrum, the very quiet waters of some sounds allow very fine organic mud to settle out. Such material is so soft and anoxic that, again, very few organisms other than bacteria can exist in it. In semi-protected locations, where energy levels are intermediate, the substrate will consist of muddy sand or sandy mud, and here the benthic fauna will be the most diverse and abundant.

A few macrofaunal forms can survive on open, surf-beaten beaches. In the New England area, large edible surf clams bury themselves in the sand of the surf zone. These, along with wedge clams, are often cast up alive on the beach. This is also the habitat of the lady crab and the flatfish.

Farther south on the Atlantic Coast, surf clams and flatfish continue to be important. Certain filter feeders, such as the mole crab and bean clams, adapted to rapid burrowing, live in the zone of breaking waves. The ghost crab lives in supratidal burrows.

In the semi-protected bottom of the sound just behind a barrier island or spit, an enormous variety of organisms live in or on a substrate of intermediate grain size. Among the soft substrate fauna are several commercially valuable crustaceans and bivalves. Also present are their predators: blue crabs, horseshoe crabs, and large carnivorous snails.

(2) Eelgrass Communities

Eelgrass fields trap sediment and over time tend to make their substrate muddier than the surrounding bottom. The leaves and stems of the plants provide a distinctive habitat for organisms adapted to attaching to them or crawling on them. Certain animals, such as the bay scallop, are more abundant and prosperous in eelgrass than anywhere else. Juvenile fish of many species find shelter among the plants, as well as forage. Small gastropods, amphipods, and polychaetes are prominent among invertebrate exploiters of this habitat. New England eelgrass plants seem to be far "cleaner" than those near the southern end of the range of the species in North Carolina which support a rich and varied epifauna.

(3) Mussel Beds

In the New England area, the edible mussel grows on rocks and pilings but also forms large beds on sandy bottoms. They are of potentially high commercial value as their popularity as food increases on this side of the Atlantic.

(4) Salt Marshes

These intertidal habitats are physically part of the landward side of barrier structures. The animals of salt marshes do much to maintain the high productivity of these communities. Suspension feeders such as mussels strain the water column and deposit on the marsh surface much organic matter in the forms of fecal and pseudo-fecal pellets, thus greatly enriching the soil in phosphorous. Fiddler crabs and other desposit feeders recycle nutrients and metals and further "pelletize" the surface, resulting in increased stability and retention of minerals.

The periwinkle and the pulmonate snail, which crawl on the mud and the grass stems of salt marshes, and the mud nassa, which is abundant in the ooze of the creeks, are common in New England. Oysters may be attached to the roots of the grass, and the ribbed mussel embedded in the mud.

The shrimp and the blue crab enter the marsh creeks. The sand fiddler and mud fiddler dig burrows into the sand and muddy parts of the marshes respectively. The green crab is also often abundant in New England marshes. The mummichog, and the American eel are characteristic northern salt marsh fishes. The diamondback terrapin of culinary fame inhabits marshes as far north as Cape Cod, but it is more abundant in southern States.

Farther south, the pulmonate snail and the ribbed mussel are still present, along with the Carolina marsh clam. Shrimp and blue crab also are present as are the mud crab and the "square-backed fiddler". Some fish commonly reported from marsh creeks in North Carolina are the American eel, sheepshead minnow, mummichog, spot, croaker, striped mullet, and several others.

All salt marshes teem with insects, especially mosquitoes, gnats, greenheads, grasshoppers, and dragonflies. Numerous mites and spiders exist here as well.

(5) Solid Substrates

Zonation is a universal feature of solid surface communities that extend through the intertidal levels. A high intertidal barnacle zone and a mussel zone below it are more or less world-wide in occurrence, and on temperate shores there is usually a zone of brown algae below the mussels. Ecologists have shown experimentally that the upper limit of intertidal organisms is usually set by environmental tolerances, and the lower limit by some biotic factor.

A physically very harsh environment will have few and scattered organisms; this is the case in the high intertidal zone, where desiccation is severe, and on surfaces exposed to pounding surf, where most animals are wiped out before they really get established.

In environments of moderate severity, such as the midintertidal zone on a shore of moderate wave energy, competition is often the primary force that determines community structure; barnacles and mussels undergo strong intra and inter-specific competition.

Where environmental conditions are most benign, as in the low intertidal zone of a moderate energy shore, predators can be active and their behavior will determine the rest of the community. By removing many of the sessile colonists, the predators keep some space open and prevent any one prey species from becoming so abundant that it competes severely for space with its neighbors. Community diversity is greater than it would be in either a wave-swept or a highly competitive situation.

Many types of organisms are adapted to crawling over or among the sessile animals and algae of this community. It is common for attached organisms to rest on other organisms ("secondary space") as well as on the non-living surface ("primary space").

The solid substrate community is best developed on large, continuous objects such as rocks and pilings, but small outposts of this community are found wherever there is a solid object in the water.

3. Rare and Endangered Species

Coastal barrier island (CBI) ecosystems along the Atlantic and Gulf Coasts are among the most unique, diverse, and productive ecosystems in the world. The flora and fauna of CBI are components of highly evolved systems with complex associations which, if not disturbed, are able to exist and, often, flourish in this harsh, high energy environment.

Individual CBI tend to be ephemeral features in geologic and evolutionary terms. However, this land form has existed for a sufficiently long period that a number of animals and plants have evolved that are specifically adapted to and maintained by the unique balance of forces which occur in this environment. While adapted to the natural stress and major storm events inherent to CBI, this specialization makes these species particularly vulnerable to human modifications of their environment. Even actions located outside of their immediate habitat niche which alter the dynamics, both short and long term of these land forms can have a detectable adverse impact. Man, through uncontrolled and ill-conceived development, can and has caused irretrievable damage to these native species.

As a consequence of these special circumstances, there is a concentration of species on CBI which are presently considered endangered, threatened, or of special concern under the Federal Endangered Species Act of 1973, as amended (16 U.S.C. 1531 - 1543) and by most of the 18 states of the East and Gulf Coasts. Other species yet to be formally classified as rare and endangered undoubtedly also exist on CBI. For example, no plants endemic to CBI have yet been listed although it is expected some species will eventually be so designated.

Listed in Table 6, are 34 species associated with coastal barrier islands currently known to need special considerations if they are to survive. This table presents information relating to the Federal and State designations and status of each species. A brief description of the types of habitat utilized by each species is also given.

D. Vegetation[1]

Barrier spits and islands of the East Coast cross the major vegetation zones of eastern North America from Maine to Texas (See Figure 5). Plants are important on the barrier islands especially in the dune zone because they stabilize the dune or ridges and act as traps. Sand blown off the beach would just keep moving inland if it were not for beach grasses in the northeast and sea oats in the southeast. These grasses have two distinctive characteristics: they can tolerate the salt spray

1/ This section is based on a more complete discussion prepared by Dr. Paul Godfrey and Dr. Steve Leatherman for the barrier island study.

Table 6

Endangered Species on CBI

(Federally Listed Species Only)

Species	Listing Status Federal 1/	 State 2/	Habitat Requirements	Dependency on Habitat 3/ Nature 4/	 Degree 5/	Threats	Current Range 6/
Mammals							
Cumberland Island Pocket Gopher (Geomys cumberlandius)	C	L(GA)	Deep friable soils with scrub vegetation	1 4 5	T T T	Destruction of vegetation	Camden County, Georgia
Manatee (Trichechus manatus)	E	E(NC, SC, GA, TX) T(FL) L(NC, SC, GA, FL, AL)	Warm (>76°F) coastal fresh and saline waters in estuaries, bays, sluggish rivers with abundant submerged, floating and emergent vegetation.	1 4 5	T T T	Pollution of water, heavy boat traffic destruction of water vegetation	SC to TX
Alabama Gulf Beach Mouse (Peromyscus polionotus ammobates)	C		Sparsely vegetated coastal dunes.	1 4 5	T T T	Destruction of dunes.	Mobile Point, AL (between Mobile and Perdido Bays)
Anastasia Island Cotton Mouse (Peromyscus gossypinus anastasae)	C	L(FL, GA)	Sand hills and dunes with open to moderately dense vegetation.	1 4 5	T T T	Destruction of vegetation.	St. Johns County Florida
Choctawhatchee Beach Mouse (Peromyscus polionotus allophrys)	C	L(FL)	Coastal dunes with cover of bluestem and sea oats.	1 4 5	T T T	Destruction of vegetation.	Okaloosa, Walton and Bay Counties, Florida
Pallid Beach Mouse (Peromyscus polionotus decoloratus)	C	L(FL)	Sea oats zone of sand dunes and dunes with sparse vegetation.	1 4 5	T T T	Destruction of dunes or dune vegetation.	Flagler, St. Johns, Volusia Counties, Florida

Mammals (continued)							
Perdido Key Beach Mouse (*Peromyscus polionotus trissyllepsis*)	C	L(FL, AL)	Sparsely vegetated coastal dunes.	1 4 5	T T T	Dune destruction.	Escambia County, FL, Baldwin County, AL
Captiva Island (insular) Cotton Rat (*Sigmodon hispidus insulicola*	C	L(FL)	Marsh areas with moderate to dense vegetation.	1 4 5	T T T	Filling/dredging marshes.	Lee County, Florida
Pine Island Rice Rat (*Oryzomys palustris planirostris*)	C	L(FL)	Wetland with dense vegetation.	1 4 5	T T T	Loss of vegetation	Pine Island, Florida
West Indian Monk Seal (*monachus tropicalus*)	Extinct	L(FL, TX)	Sandy beaches and surrounding nearshore and estuarine shallows.	1 4 5	P P P	Unknown.	Unknown
Delmarva Fox Squirrel (*Sciurus niger cinereus*)	E	E(MD)	Oak openings, savannahs, narrow belts of trees with a mature stand of mixed mast trees.	1 3 4 5	T T T T	Destruction of nesting and feeding areas.	Delmarva Peninsula including Chincoteague NWR
Red Wolf (*Canis rufus*)	E	E(MS, TX) L(FL, AL, MS, TX)	Coastal prairies and marshes with dense cover along streams, ridges, and bayous.	1 4 5	I I I	Unknown.	East of Galveston Bay TX to Calcasieu Lake, LA
Birds							
Whooping Crane (*Grus americana*	E	E(TX) L(FL, AL, TX)	Salt flats and adjacent islands dominated by salt grass, saltwort, glasswort, sea ox-eye and gulf cordgrass.	3 4 5	P P P	Pollution, sedimentation, dredging, etc. destroying plant life needed by cranes.	S.E. Texas coast-Matagorda and San Jose Island, Lower Matagorda Peninsula
Eskimo Curlew (*Numenius borealis*)	E	E(SC, TX, NY, RI, CT) L(SC, TX, MD)	Uses coastal beaches, tide flats, marshes, sand dunes and upland meadows during migrations.	1 2 3 4 5	P P P P P	Unknown.	Texas coast
Bald Eagle (*Haliaeetus leucocephalus*)	E	E(ME, NJ, NY, CT, NC, SC, GA, MS, TX, RI) T(FL)	Riparian or estuarine habitat. Remote forests with perch and nesting trees. Clear flight path to beach, estuary or river. Open view of	1 4 5	P P I	Loss of feeding and nesting areas. Disturbance by man's activities.	Coastal areas from ME to TX

pages tightly bound

Birds (continued)

Arctic Peregrin Falcon (*Falco peregrinus tundrius*)	E	E(RI, CT, NY, NJ NC, SC, GA, FL, MS, TX) T(MD NC, SC, GA, FL, AL, MS, TX) L(NC, SC, GA, MD, FL, AL, MS, TX)	Use beaches, marshes, overwash fans, flats, forests with perch trees during migration	2 4 5	P I I	Clearing, development of feeding and resting sites	Coastal areas from ME to TX
Eastern Brown Pelican (*Pelecanus occidentalis*)	E	E(NC, SC, GA, FL, MS, TX) L(NC, SC, GA, FL, AL, MS, TX)	Uses shallow estuarine waters for feeding. Ground nesting on coastal islands with or without shrubs/trees. Resting/nocturnal/roosting on spits, exposed sand bars, beaches (ocean and estuarine).	1 3 4 5	T P P P	Development causing loss of nesting sites; pollution reducing feeding habitat.	Coastal Islands from NC to TX
Cape Sable Sparrow (*Ammospiza maritima mirabilis*)	E	E(FL)	Brackish marshes.	1 3 4 5	P P P P	Filling of marshes.	S.W. FL - Ochopee Marshes to Shark River
Dusky Seaside Sparrow (*Ammospiza maritima nigrescens*)	E	E(FL)	Periodically flooded, burned cordgrass (*Spartina bakerii*) prairies.	1 3 4 5	P P P P	Filling marshes, flooding for mosquito control, excessive burning.	Orange and Northern Brevard Counties, FL
Bachman's Warbler (*Vermivora bachmanii*)	E	E(NC, SC, GA, FL, MS, LA, TX) L(GA, FL, AL, MS, TX)	Uses dense (almost thicket-like) river swamps during migration.	2	I	Unknown.	Unknown
Kirtlands Warbler (*Dendroica kirtlandii*)	E	E(NC, SC, GA, FL) L(SC, GA, FL)	Wooded uplands during migration.	2	I	Unknown.	Unknown
Red-cockaded woodpecker (*picoides* (=*Dendrocopos*) *borealis*)	E	E(RI, CT, MD, NC SC, GA, FL, MS, TX) L(MD, VA, NC, SC, GA, FL, AL, MS, TX)	Mature diseased pines used for nesting, roosting and forageing.	1 3 4 5	T P P P	Short rotation timber management. Destruction of pine stands.	S.E. VA to SC spotty coastal FL and northern Gulf

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Reptiles

American Alligator (Alligator mississippiensis)	E(NC, AL, MS) T(GA, SC, FL, TX) T/SA(LA)	E(NC, GA, MS, TX) T(FL) L(NC, SC, GA, FL AL, MS, TX)	Swampy and marshy shallow fresh water areas. Moist vegetation required for nesting.	1 3 4 5	T P P P	Filling marshes and swamps behind/on coastal barrier islands.	Southeast and Gulf coasts - NC to TX
American Crocodile (Crocodylus acutus	E	E(FL) L(FL, AL)	Saline and brackish bays, brackish creeks and canals mangrove swamps, coastal marshes; nests in mangrove, other hardwood thickets at heads of small sand beaches along estuaries and on marl banks along narrow coastal creeks.	1 3 4	T T T	Destruction of nesting habitat, harrassment.	Florida from Key Largo to Marco Island
Atlantic Salt Marsh Snake (Nerodia fasciata taeniata	T	E(FL)	Tidal creeks and salt marshes usually associated with fiddler crab burrows and glassworts and in black mangrove swamps.	1 3 4 5	T T T T	Destruction and filling in of marshes.	Volusia, Brevard Indian River Counties, FL
Green Sea Turtle (Chelonia mydas)	E(FL) T(elsewhere)	E(NJ, MD, FL, MS, TX) L(NC, GA, FL, AL, L(NC, GA, FL, AL, MS, TX)	Pelagic species. Nests on beaches.	1	T	Use and development of nesting beaches.	MA to TX
Hawksbill Sea Turtle (Eretmochelys imbricata)	E	E(NJ, MD, GA, RI, CT, FL, MS, TX) L(NC, GA, FL, AL)	Offshore oceanic/pelagic species. Nests on undisturbed, deep-sand beaches in tropical regions.	1	T	Use and development of nesting beaches.	FL to TX
Kemps Ridley Sea Turtle (Lepidochelys kempii	E	E(RI, CT, NJ, MD, SC, GA, FL, MS, TX) L(NC, SC, GA, FL, AL, TX)	Shallow coastal and estuarine waters. Often associated with red mangroves. Nest on beaches with a well-defined and elevated dune area backed by extensive bodies of open water with seasonal, narrow connections with the open ocean.	1	T	Nesting beach development and use; destruction of dunes.	MA to TX
Leatherback Sea Turtle (Dermochelys coriacea)	E	E(RI, CT, NJ, MD, NC, SC, GA, MS, TX) L(NC, SC, GA, FL, AL, MS, TX)	Pelagic species. Occasionally enters estuaries in northern waters. Nests on sloping sandy beaches backed by vegetation.	1	T	Nesting beach development and use.	ME to TX
Loggerhead Sea Turtle (Caretta caretta)	T	E(MS, MD) T(FL) L(NJ, NC, SC, GA, FL, AL, MS, TX)	Nesting on beaches.	1	T	Use and development of nesting beaches.	

Fishes							
Shortnosed Sturgeon (Acipenser brevirostrum)	E	E(RI, CT, NY, NJ, NC, SC, GA, FL) L(NC, SC, GA, FL)	Tidal rivers along the Atlantic seaboard.	1 3 4 5	T T T T	Pollution and sedimentation.	St. Johns River, FL to St. Johns River, Nova Scotia
Insects							
Tiger Beatle (Cicindella dorsalis sspp.)	C	E(RI,NY,NJ,MD,VA, NC,SC,GA,FL,AL, MS,TX,LA	Breeds just above high tide line on sandy beaches.	1	T	High use by people	RI,NJ,MD,VA,NC, SC,GA,FL,AL,MS, LA,TX
Ontario Hairstreak Butterfly (Euristrymon ontario sspp.)	C	L(NC)	Caterpillar found on Maritime Live Oak (Quercus virginiana maritima).	1 4 5	T T T	Destruction of maritime hardward forests.	Dare and, possibly Hyde Countries, NC
Henry's Elfin Butterfly (Incisalia henrici ssp.)	C	L(NC)	Caterpillar found on Yaupon (Ilex vomitoria).	1 4 5	T T T	Destruction of Yaupon Shrubs	NC Coastal Barrier Islands

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1/ Categories of Federal listings used in this table:
E - Endangered
T - Threatened
P/E or T - Proposed/Endangered or Threatened
C/E or T - Candidates for Listing/Endangered or Threatened
T/SA - Threatened/Similarity of Appearance

2/ State listing status E (Endangered and T (Threatened means that specific state legislation exists to protect the species so noted. On the other hand, L (listed by the state) means no protective legislation exists, but there is some concern about and special recognition of the species so noted.

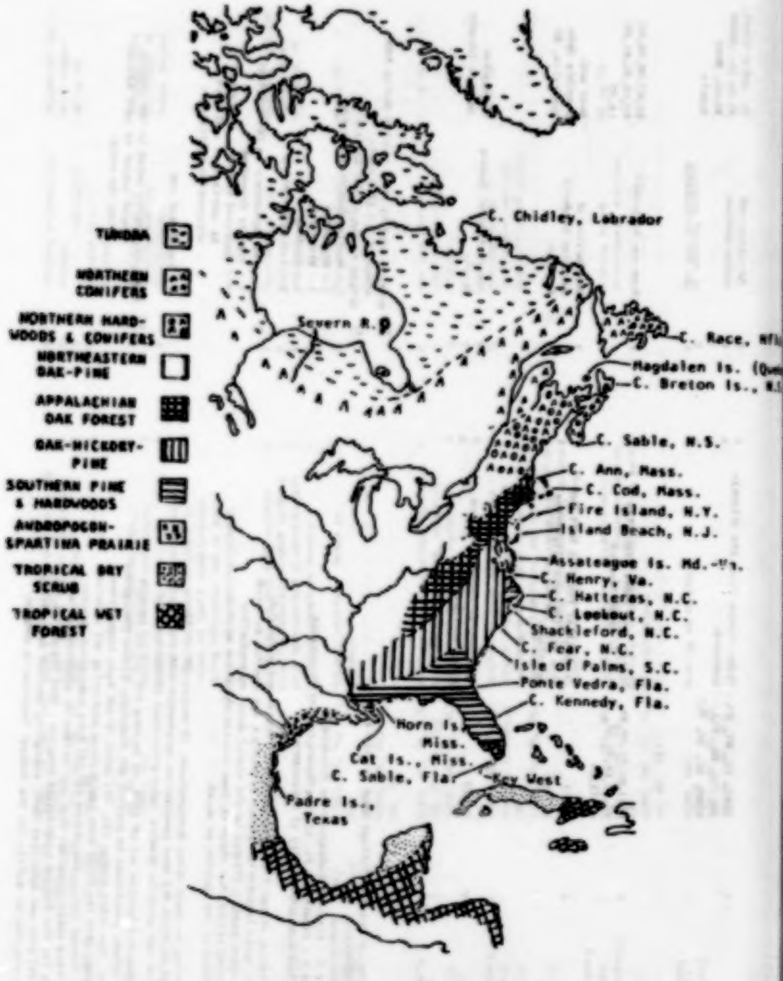
In addition to these state designations, 10 states (ME,NY,NJ, DE,MD,VA,NC,SC,GA,FL) have cooperative agreements with the U.S. Fish and wildlife Service under provisions of Section 6 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1535(c) which include provisions to protect all Federally listed Endangered Species. Two other states (RI, CT) which do not have cooperative agreements with the USFWS have legislation protecting all species on the Federal list. Two states (CT,LA) have endangered species authorities and/or programs that are unclear or otherwise do not qualify for the Federal cooperative program. Five States (AL,MA, MS,RI,TX) have not submitted their endangered species authorities and/or programs to qualify for the Federal Cooperative program.

3/ Habitat used by each species during some stage of its life cycle.

4/ Nature of use of CBI habitat:
1 - Nesting/breeding/nursery
2 - Migration
3 - Wintering
4 - Feeding
5 - Resting/Roosting

5/ Degree of dependence on CBI habitat:
T - Totally dependent
P - Preferred habitat. Prefered by specie over available alternative habitat(s).
I - Incidental use

6/ Range of species noted is the current lineal extent of each species along the coast.


TUNDRA
NORTHERN CONIFERS
NORTHERN HARDWOODS & CONIFERS
NORTHEASTERN OAK-PINE
APPALACHIAN OAK FOREST
OAK-HICKORY-PINE
SOUTHERN PINE & HARDWOODS
ANDROPOGON-SPARTINA PRAIRIE
TROPICAL DRY SCRUB
TROPICAL WET FOREST
C. Chidley, Labrador
Severn R.
C. Race, Nfl
Magdalen Is. (Que
C. Breton Is., N.
C. Sable, N.S.
C. Ann, Mass.
C. Cod, Mass.
Fire Island, N.Y.
Island Beach, N.J.
Assateague Is. Md.-Va.
C. Henry, Va.
C. Hatteras, N.C.
C. Lookout, N.C.
Shackleford, N.C.
C. Fear, N.C.
Isle of Palms, S.C.
Ponte Vedra, Fla.
C. Kennedy, Fla.
Horn Is. Miss.
Cat Is., Miss.
C. Sable, Fla.
Key West
Padre Is., Texas

VEGETATIVE ZONES
FIGURE. 5

that is a major component of the beach-dune environment and they can sustain burial by windblown sand growing upward and outward as the blowing sand accumulates around them. As the dune grows and the grass continually recolonizes the sand surface, the dune becomes stabilized. Later, nitrogen-fixing plants such as bayberry and beach pea invade the dune, adding to the barren sand nitrates that fertilize other plants. With long-term stability and shelter from salt spray, shrub thickets, and eventually woodlands, can develop on the landward side of the frontal dunes.

The region from Maine to New Hampshire provides a meeting ground for typically southern species and those of the boreal north. In southeastern Maine, spruce and fir trees mingle on sand dunes with pitch pines and oaks. In general, the Maine barriers are part of the northern hardwoods region; those of northern Massachusetts and New Hampshire belong in the Appalachian oak forest region. In southeastern Massachusetts, Rhode Island, New York, and New Jersey, the barrier island forest vegetation fits into the northeastern oak-pitch pine region. The transition zone from the Delmarva Peninsula to North Carolina can be considered part of the southeastern oak-pine forest, but northern beach grass (*Ammophila breviligulata*) and deciduous oaks remain dominant.

From North Carolina to northern Florida and the Gulf Coast, the barrier island vegetation is part of the southeastern evergreen oak-pine subunit of the oak-hickory and southeastern pine forest. The presence of sea oats (*Uniola paniculata*) and live oak (*Quercus virginiana*) distinguish this vegetation from that found inland. In south Florida, the flora of the Caribbean plays an important role in the vegetation, while on the western Gulf Coast there is a rich coastal grassland.

All along the East Coast barriers, there are individual species which overlap and prevent the drawing of definite boundaries. In certain respects, it is easier to consider the vegetation as falling into northern, southern and Gulf Coast types, the major distinctions between these zones being the break between beach grass and sea oats in the dunes, and the appearance of live oak and other evergreen trees in the forests along the Virginia-North Carolina coast. For convenience, we can consider the barriers north of Delaware Bay as "northern", the Delmarva Peninsula as "transition", and the islands south of the Chesapeake Bay as "southern", with the Gulf Coast zone on the western side of Florida to Texas.

All along this coastal region, the climate of the barriers and hence their vegetation are controlled to some extent by ocean currents. The northern beaches are affected by the Labrador current, which brings cool waters south to the northern tip of Cape Cod, where certain subarctic beach plants can be found. The Gulf Stream brings warm water to within

40 miles of Cape Hatteras, thus keeping the coast south of Cape Hatteras much warmer than the mainland. The coastal area between the Outer Banks of North Carolina and southern Cape Cod is intermediate between the two extremes.

In addition to these climatic variables, the vegetation on the barriers is affected by salt spray, frequency of overwash, sand supply and the orientation of the barrier beach relative to prevailing winds and storm waves.

1. The Northern Section: Maine to New Jersey

This zone may be divided into three subunits; Maine to northern Massachusetts; southeastern Massachusetts (Cape Cod and the islands) to New York Harbor; and New Jersey. The most important feature of the northern section, exclusive of New Jersey, is its glacial history. Small though they are, the Maine barriers are very similar to their cousins further south in their dune vegetation, except for the occasional presence of spruce and fir. Further south along the New Hampshire and Massachusetts coast, drumlins and morraines provided massive sources of sediments which have been reworked into the present day barriers.

Westward from Cape Cod and the islands, the shorelines of Rhode Island and Long Island are also the result of erosion of glacial sediments, creating spits and elongated barrier beaches broken by inlets. The unglaciated coast of New Jersey is, at least floristically, part of the northern region. However, the formation of these barriers was probably more like that of the southeastern system--drowning of a beach ridge system and subsequent recession.

The vegetation of the barriers can be broken into five major categories: grasslands, shrublands, woodlands/forests, freshwater marshes and intertidal marshes. The dune grasslands are dominated throughout by beach grass (*Ammophila breviligulata*), best developed in the more northerly section. (See Table 7).

2. The Transition (or Central) Section: Delmarva Peninsula

On the Delaware coast a major change occurs in the vegetation and the physiography of the islands. Here the barriers are typically southern in their appearance; they are relatively wide, with low dunes and extensive barrier flats. (This description does not apply to the few southern beaches with extensive dunes.) The evergreen nature of the southern forests becomes increasingly evident as one goes south in Delmarva. Loblolly pine forms extensive forests of considerable interest on Parramore, Assateague and Smith Islands. Salt marshes here are extensive and well developed.

Table 7

Barrier Island Vegetative Categories

The Northern Section — Maine to New Jersey	dominated throughout by beach grass but not with the vigor it shows in the north. Appearance of salt meadow cordgrass (Spartina patens var. monogyna) plays an important role in overwash recovery.		woodland is deciduous, except for pines and junipers. Contains many members of the rose family—beach plum, cherries, shadbush, and wild roses. Dominant hardwoods - are oaks - black (Quercus velutina) and white (Q. alba). American holly (Ilex opaca) appears on the shore of Cape Cod; becomes more important on Fire Island and Sandy Hook, NJ.	generally found between dunes or where blowouts have reached the water table. Cattails (Typha) and reeds (Phragmites) dominate the marshes. Azaleas (Rhododendron), blueberries (Vaccinium), alders (Alnus), arrowwood (Viburnum), dominate the shrub swamps. Red maple (Acer rubrum) and tupelo (Nyssa sylvatica), the tree swamps.	typical of most of the East Coast except the high marsh of salt meadow cordgrass (Spartina patens), and salt grass (Distichlis spicata) more extensive in the north. Pannes of depressions in the high marsh more prevalent; and macroscopic brown algae—rockweed (Fucus) and knotted wrack (Ascophyllum) are mixed with the Spartina alterniflora plants. Low marsh dominated by S. alterniflora - flooded by daily tides.
The Transition (or Central) Section - Delmarva Peninsula	dune grasslands still dominated by beach grass, but not with the vigor it shows in the north. Appearance of salt meadow cordgrass (Spartina patens var. monogyna) plays an important role in overwash recovery.		evergreen nature of the southern forests. Red bay (Persea borbonia) mixes with holly to created an evergreen hardwood forest; also Red cedar (Juniperus virginiana) and loblolly pine (Pinus taeda). Deciduous oaks, red maple, and tupelo also common.		extensive and well developed salt marshes. Low marsh of S. alterniflora of more significance than in north. Spear grass in the high marsh. Black needle rush (Juncus roemerianus) appears in the high marsh, linking region with the south. S. patens and Distichlis spicata also common in the high marsh.
The Southern Section: North Carolina to Florida					
1. Outer Banks	sea oats take over dominance of the dune grassland, typical dune species of the southern U.S. coast. In some areas Spartina patens shares dominance with sea oats. Panic grass (Panicum amarulum), love grass (Eragrostis), purple muhly (Muhlenbergia), ground cherry (Physalis) and pennywort (Hydrocotyle) also come into the vegetation.	Red mulberry (Morus rubra), southern wax myrtle (Myrica cerifera), yaupon holly (Ilex vomitoria), French mulberry (Callicarpa) replace bayberry, plums, cherries and roses in ecological position of the north.	maritime forest become dominated by live oak (Quercus virginiana). This woodland found only on protected sites or well back from the beach.		
2. Beaufort Inlet to Cape Romain	extensive grasslands less common	shrub thickets can occur down to the first line of dunes.	woodland vegetation can occur down to the first line of dunes. Forest more diverse.		often occupy all the low lands between the barrier and the mainland.
3. Georgia embayment	dune ecosystem is dominated by sea oats, salt meadow cordgrass, croton, southern elder (Iva,) yucca, and others.		forest vegetation of live oak laurel oak, loblolly pine, cabbage palm, magnolias, bumelia, and dense understory of palmetto.		some of the best examples of low salt marsh along the East Coast; including the famous Marshes of Glynn. Dominated by S. alterniflora throughout with the high marsh restricted to areas near uplands.
4. Florida			vegetation changes little. Southern end supports evergreen oaks and thickets of sub-tropical hardwoods and vines.		
The Gulf Coast 1. Mississippi River Delta to Florida	many regions are barren. Along the coast of Mississippi, Alabama and the Florida panhandle, dune area dominated by sea oats.	consists of species not found in the north - shrubby goldenrod (Chrysoma pauciflosculosa), rock rose (Helianthemum arenicola), sand rosemary (Ceratiola ericoides) and red calamint (Calamintha coccinea).	forest vegetation restricted to isolated groves: slash pine (Pinus elliottii) dominates woodland vegetation on many islands, where it occurs with live oak (Quercus geminata), myrtle oak (Q. myrtifolia), and sawtooth palmetto (Serenoa serrulata). Isolated spots of hardwood forest of live oak, hercules club (Zanthoxylum clava-herculis), and bumelia (Bumelia), mixed with palms and yaupon holly.		Extensive salt marshes, largest on the Gulf Coast, exist throughout Mississippi Delta region. Dominated by several species of cordgrass (Spartina), S. alterniflora most important.
2. Mississippi River Delta to Texas	dominated by sea oats and salt meadow cordgrass along with croton, sand spur, beach evening primrose (Oenothera humifusa), and railroad vine (Ipomoea stolonifera).		small forests of oak possibly as a result of human use and grazing pressure.		high salinity usually precludes establishment of salt marsh halophytes such as Salicornia and Batis are common.

3. The Southern Section: North Carolina to Florida

The great range of environmental conditions along the southeastern United States permits the division of this section into smaller subunits; the Outer Banks; Beaufort Inlet to Cape Romain; the Georgia embayment; and Florida.

From Cape Romain south, the vegetation is a combination of mainland and dune strand species. As one continues south into Florida, the vegetation changes little. Of growing importance in Florida is the presence of carbonate soils, and also of plant species from the Caribbean. The southern end of the State supports mangrove swamps and thickets of subtropical hardwoods and vines.

4. The Gulf Coast

The barrier island system resumes on the west coast of Florida and continues to Texas. This system can be broken into an eastern section (Mississippi River Delta to Florida) and a western section from the Delta to Texas. In the east, many regions are barren with extensive low sand dunes and sand flats suggestive of frequent overwashes. West of the Mississippi, the barrier chain is well developed from Port Arthur to Brownsville, Texas, with Padre Island illustrating characteristic features of the coast.

The interior of Padre Island consists of low dunes and extensive flats; the latter may be either deflation plains or overwash terraces depending on recent geological events. Wetlands are scattered as shallow ponds in depressions or between dunes. The only forest on Padre Island is a small stand of five oak trees near the southern half; it has been suggested that human use and grazing pressure caused a general decline of the natural forest vegetation.

High salinity levels that develop behind Padre Island in Laguna Madre have precluded the successful establishment of salt marsh, so the western shore of Padre Island is a sandy beach with low dunes. Halophytes such as Salicornia and Batis are common.

E. Soils

The soils of barrier islands are generally poorly developed; most are sand or peat. The type of sand on which soil is developed plays a significant part in the chemical composition of the soil. In general, the northern sands are nearly all siliceous, with little in the way of carbonates. As one goes further south, the carbonate fraction increases and adds more available calcium to the nutrient reservoir. Deeper south, carbonate sands dominate, especially along the Florida coast.

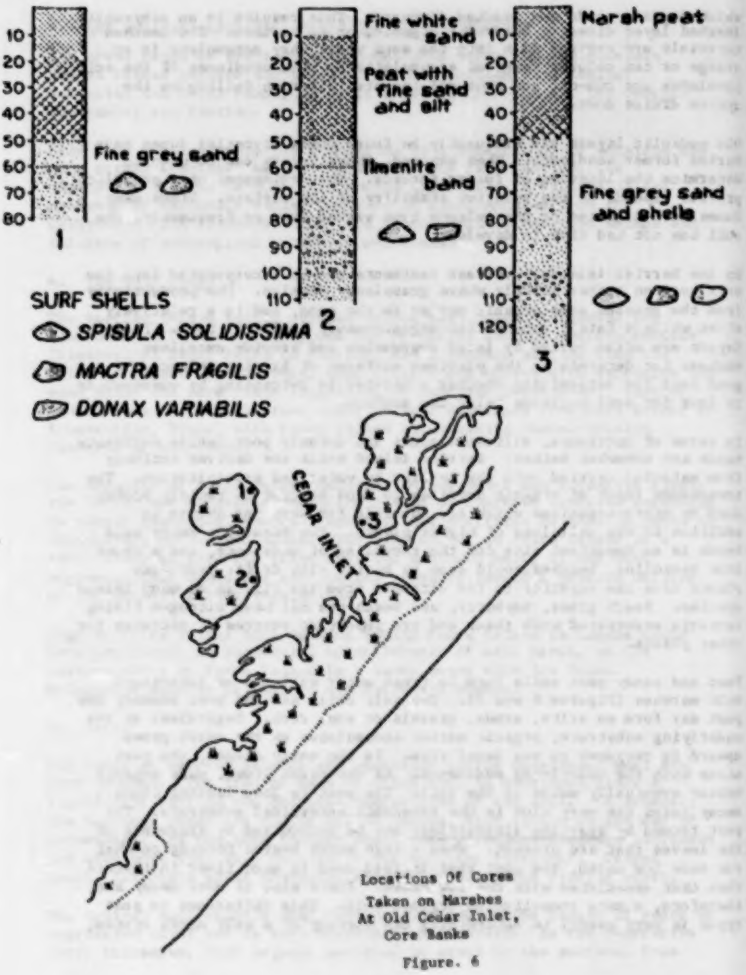
The typical soil profile that develops on sand is the result of years of vegetative cover and is best described as podzolic. As the vegetative cover increases, more organic material is added to the surface, from which organic acids are leached downward. This results in an ashy-white leached layer directly below the organic, or A, horizon. The leached materials are carried down into the sand where they accumulate in an orange or tan colored "zone of accumulation". The sandiness of the soil precludes any run-off and thus all the precipitation falling on the system drains down.

Old podzolic layers can frequently be found where migrating dunes have buried former woodlands. When exposed, these layers can be used to determine the location of former forests. The devlopment of a podzolic profile depends on the relative stability of the surface. Since many dunes have migrated or the islands have washed over so frequently, the soil has not had time to develop.

On low barrier islands, overwash sediments can be incorporated into the soil horizon rather quickly where grasslands develop. The productivity from the grasses adds organic matter to the sand, and in a relatively short while a fairly substantial organic-sandy soil will form. These layers are often buried by later overwashes and provide excellent markers for determining the previous surfaces of barrier islands. A good test for determining whether a barrier is retreating by overwash is to look for soil horizons below the surface.

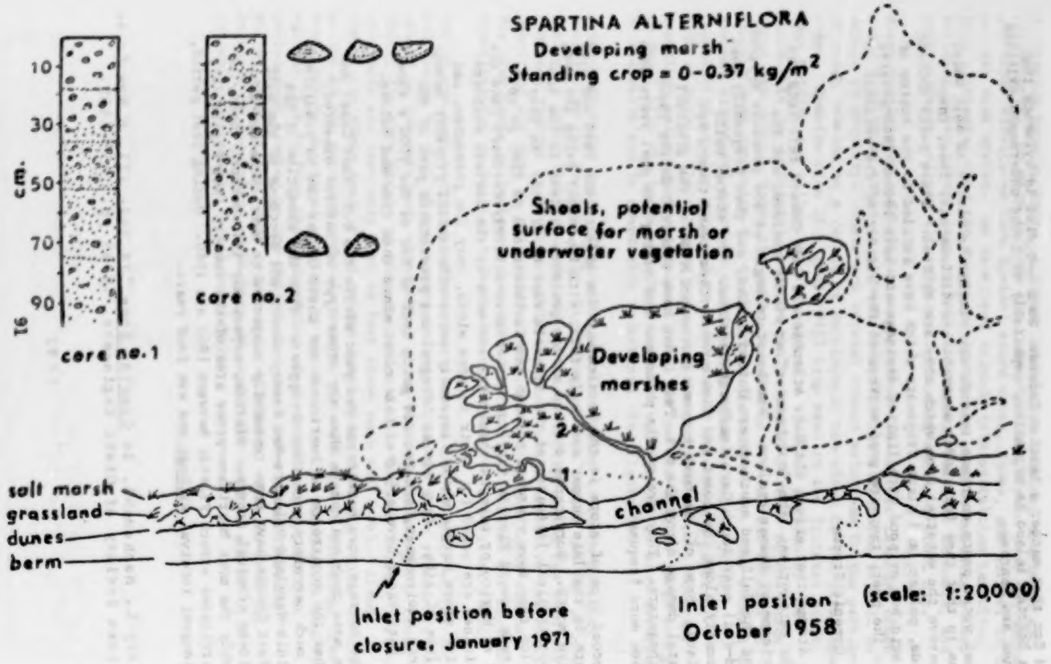
In terms of nutrients, siliceous sands are notably poor, while carbonate sands are somewhat better. Barrier island soils are derived entirely from material carried onto the barrier by water and precipitation. The tremendous input of organic detritus to sand beaches is rapidly broken down by micro-organisms which are specific for agar and chitin in addition to the cellulose of higher plants. The seemingly empty sand beach is an important site for the recycling of nutrients, and without this recycling, beaches would soon be buried with drift. Many dune plants have the capacity to fix nitrogen from the air, as do many inland species. Beach grass, bayberry, and beach pea all have nitrogen fixing bacteria associated with them, and are important sources of nitrates for other plants.

Peat and sandy peat soils form in fresh water wetlands or intertidal salt marshes (Figures 6 and 7). The salt soils are the most common; the peat may form on silts, sands, gravels or even rock. Regardless of the underlying substrate, organic matter accumulates as the marsh grows upward in response to sea level rise. In the early stages, the peat mixes with the underlying sediments. As the marsh grows, pure organic matter eventually makes up the soil. The peat is long lasting since decay rates are very slow in the anaerobic intertidal substrate. The peat formed by *Spartina alterniflora* may be recognized by fragments of the leaves that are present. When a high marsh begins forming on what was once low marsh, the peat that is laid down is much finer in texture than that associated with the low marsh. There also is more decay and, therefore, a more consolidated organic soil. This difference in peat types is very useful in determining the history of a salt marsh system,


10
20
30
40
50
60
70
80
Fine grey sand
1
Fine white sand
Peat with fine sand and silt
Ilmenite band
90
100
110
2
Marsh peat
Fine grey sand and shells
120
3
SURF SHELLS
SPISULA SOLIDISSIMA
MACTRA FRAGILIS
DONAX VARIABILIS
CEDAR INLET
1
2
3

Locations Of Cores
Taken on Marshes
At Old Cedar Inlet,
Core Banks

Figure. 6


SPARTINA ALTERNIFLORA
Developing marsh
Standing crop = 0-0.37 kg/m²
cm.
10
30
50
70
90
91
core no. 1
core no. 2
Shoals, potential surface for marsh or underwater vegetation
Developing marshes
2
1
salt marsh
grassland
dunes
berm
channel
Inlet position before closure, January 1971
Inlet position October 1958
(scale: 1:20,000)

DRUM INLET SUCCESSION
FIGURE. 7

and for that matter a barrier island. Such material is evidence that the barrier island is migrating, especially if found underneath existing dunes and beaches.

Fresh water peats on these islands are similar in nature to salt water ones in that they form under anaerobic conditions and, thus, they preserve the material from which they are derived. These peats contain seeds, pollen, and plant fragments which have settled to the bottom of an acid bog or pond with limited drainage and have become incorporated into the peat; they are good markers of the history of the wetland.

F. Oceanic Storms

The storms that affect the U.S. Atlantic and Gulf Coasts fall into two basic categories: the "northeaster" or winter cyclone, and the hurricane or summer cyclone. Northeasters begin as low pressure systems along the Gulf and southeastern United States, and then frequently make land-fall near South Carolina/North Carolina. The storms build intensity along the coast and then move northeastward toward New England. Some of the most intense storms and some of the greatest coastal damage along the U.S. East Coast have occurred during these northeasters. They are yearly phenomena and during the past years have become more frequent.

A second type of storm is the hurricane which affects the East and Gulf Coasts in the late summer and early fall, with September being the most active month. Hurricanes develop as low pressure systems in the sub-tropic/tropical latitudes of the Atlantic west of Africa. As they develop they move westward through the Caribbean and as they go up in latitude toward Florida they can either move directly westward into the Gulf of Mexico or turn northeastward and move up the eastern seaboard. Hurricanes are noted for their intense winds, very low pressures, and massive storm surges which frequently cause substantial property damage and loss of life. They are an integral and predictable part of the oceanic environment, and records going back as far as the 1500's show that hurricanes have affected this coast since that time and before.

On the average, two hurricanes per year strike the U.S. East Coast and cause more combined damage than any other type of natural disaster.* Neither the occurrence of hurricanes nor their course can be predicted with much certainty once they do appear. With the exception of the Virginia-Maryland-Delaware-New Jersey shore, all sections of the Gulf and East Coasts have been repeatedly subjected to hurricanes and sub-hurricane tropical storms. Florida, especially its southern coast, is probably the most hurricane-prone area of the country (See Figure 10); 43 hurricanes struck Florida between 1900 and 1960. During that period, the longest interval without one was four years.

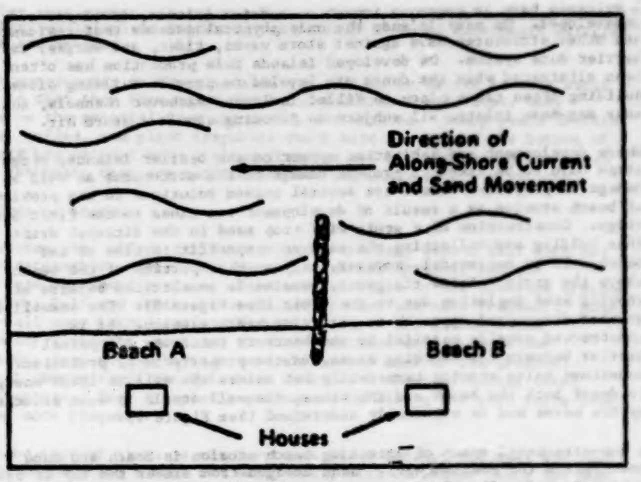
* Jerry L. Machemehl, in Coastal Zone '78 Vol. III, C New York: American Society of Civil Engineers, 1978) pp. 1453-1468.

Hurricanes have an enormous impact on barrier islands, developed and undeveloped. On many islands the only physical defense that residences and other structures have against storm waves, tides, and surges, is the barrier dune system. On developed islands this protection has often been eliminated when the dunes are leveled to provide building sites. Building often takes place in filled lowlands, washover channels, and near man-made inlets, all subject to flooding should a storm hit.

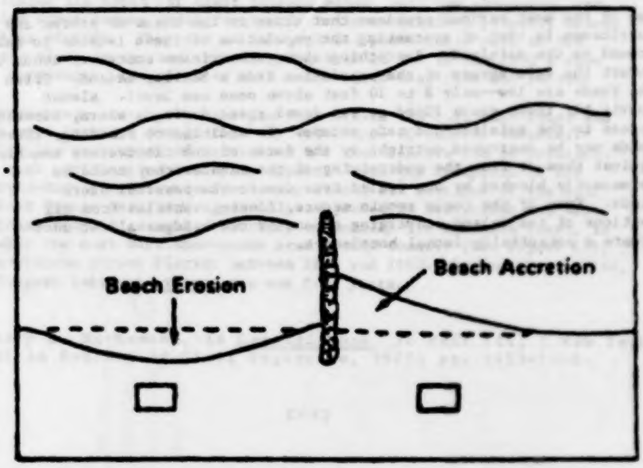
Where development and habitation appear on the barrier islands, often steps have to be taken to prevent damage to the structures as well as damage to property. There are several common solutions to the problem of beach erosion as a result of development too close to the first dune ridge. Construction of a groin will trap sand in the littoral drift, thus holding and collecting the sand on a specific portion of the beach. It is successful, however, only on that portion of the beach above the groin. Below the groin, erosion is accelerated because of ensuing sand depletion due to the groin (See Figure 8). The seawall is another structural approach to arresting beach erosion. It is constructed usually parallel to the beach to interpose a physical barrier between the oncoming waves and the property to be protected. It sometimes halts erosion temporarily but unless the wall is large enough to dwarf both the beach and the waves, the wall itself is soon attacked by the waves and is eventually undermined (See Figure 9).

A non-structural means of arresting beach erosion is beach and dune restoration (or nourishment). Sand dredged from either the bay or ocean bottom is hydraulically deposited on the beach, replacing the sand that had been removed by erosion. This is an extremely expensive and complex operation and must be maintained yearly, also at significant expense. The Army Corps of Engineers has spent nearly $33.5 million for shoreline stabilization on barrier islands during the past three fiscal years.

One of the most serious problems that arise in the event of storms and hurricanes is that of evacuating the population of these islands to safe ground on the mainland. Everything about a hurricane emergency tends to thwart the safe egress of the population from a barrier island. Often the roads are low--only 8 to 10 feet above mean sea level. Almost inevitably these roads flood as sea level rises during a storm, blocking access to the mainland and safe escape. In addition to flooding, these roads may be destroyed outright by the force of the floodwaters smashing against them or from the undermining of the sand or they could be permanently blocked by one felled tree due to the powerful storm winds. Even if the roads remain secure, fleeing vehicles from all sections of the island converging on one or two bridges all at once create a potentially lethal bottleneck.

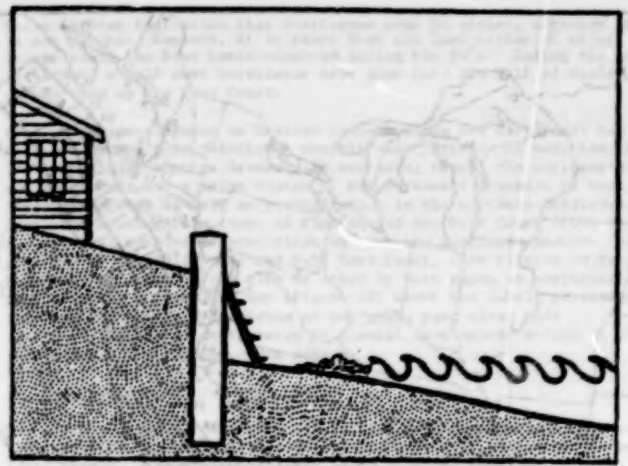

Direction of
Along-Shore Current
and Sand Movement
Beach A
Beach B
Houses

A. Groin Newly Constructed to Protect Beach B

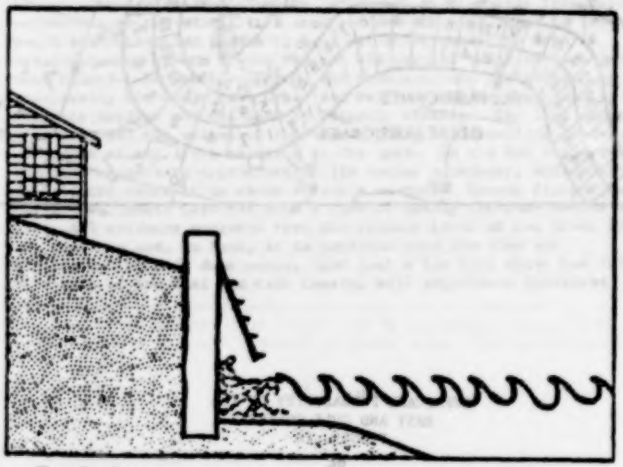

Beach Erosion
Beach Accretion

B. Trapped Sand Accretes Beach B at Expense of Eroded Beach A

EFFECT OF SEAWALL ON BEACH
FIGURE. 8

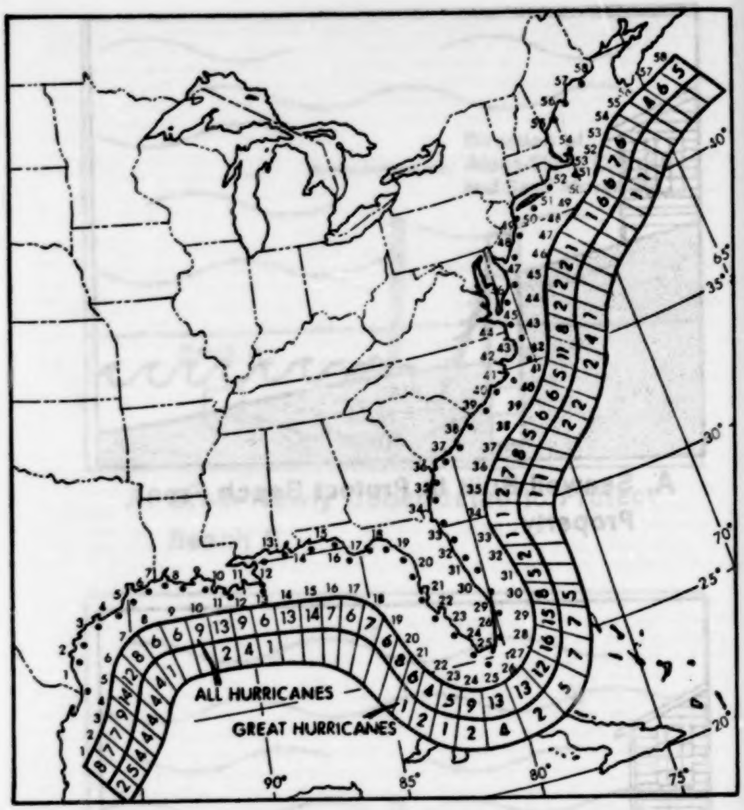


A. Seawall Built to Protect Beach Front Property



B. Subsequent Beach Erosion Due to Deflected Wave Energy

EFFECT OF SEAWALL ON BEACH
FIGURE. 9


ALL HURRICANES
GREAT HURRICANES
90°
85°
80°
75°
20°
25°
30°
35°
40°
65°
70°

HURRICANE PROBABILITY ON THE
EAST AND GULF COASTS
FIGURE. 10

There is some indication that hurricanes come in cycles, although this is not proven. However, it is known that the last series of major storms along the East Coast occurred during the 50's. During the past decade and a half most hurricanes have gone into the Gulf of Mexico rather than up the East Coast.

Most of the development on barrier islands along the East Coast has occurred during this relatively unusual calm period. In addition to driving barrier beaches landward as sea level rises, the northeasters and hurricanes are a major source of the northward movement of heat from lower latitudes, as well as precipitation in the northern latitudes. In fact, the southeastern coast of Florida and the Gulf Coast often derive the greatest sources of precipitation from the hurricane season. All portions of the Gulf Coast and U.S. East Coast, from Florida to Maine, have been affected at one time or other by hurricanes or northeasters. The Hurricane Probability Map (Figure 10) shows the likely percentage that one can expect a hurricane at any given year along this coastline. The greatest hazards to coastal development relate to the increasing potential for storm damage.

1. Sea Level

The primary driving force which is resulting in the landward movement of the coastline, whether barrier island beach or just mainland, is sea level change. The ocean level has never remained constant through geological time, but has always risen or fallen relative to the land surface. The last major change in sea level occurred during the last Ice Age. At the height of the Ice Age, the sea level was down approximately three hundred feet from its present elevation, and, as the ice started melting approximately ten to fifteen thousand years ago, the volume of water in the sea increased very rapidly. With the weight of the ice removed from the northern latitudes, particularly from Labrador northward into the Arctic, the land surface actually began to rebound upward isostatically, resulting in a situation where the land is actually coming up out of the sea and old barrier beach systems can be found inland. On the other hand, the more southern latitudes, encompassing the whole East Coast and Gulf Coast, are experiencing isostatic decline and the land is actually sinking. The land surface is going down and the volume of the sea is going up, resulting in a very rapid rise of sea level relative to the land. On the New England coast this rise amounts to approximately six inches a century, while on the mid-Atlantic coast it is about a foot a century. Recent figures for Charlestown, South Carolina show a rise of nearly fourteen inches since 1920. All evidence suggests that the present trend of sea level rise will continue and, in fact, it is possible that the rise may accelerate. If this does occur, land just a few feet above sea level, as is much of the East and Gulf Coasts, will experience increased flooding and damage from storm surges. Presently, this sea level rise is causing shoreline retreat of 50 to 200 feet a century on the average. Natural or undeveloped islands respond to this rise in sea level by migrating as a unit.

2. Tide Influence

The average range of the tides along a specific portion of the coast can be a significant factor on the frequency of overwash on a barrier beach. For example, if a storm arrives at low tide and the tidal range eight feet, as in the Georgia embayment, then the normal storm surge of three to four feet or more would not be enough to crest over a barrier beach. On the other hand, if such a storm arrives at high tide or remains in the vicinity during one tide cycle or more, the likelihood of overwash is far greater.

Where the tide ranges are narrow, a storm arriving at almost any stage of the tide cycle may cause an overwash. For instance, where the tide ranges are only about three feet, which is true for the southeastern coast of Virginia, North Carolina, and the Gulf Coast, a storm arriving at high tide will result in a substantial overwash.

G. Water and Water Quality

In most instances water is found in three forms on a barrier island. The forms include (1) salt water on the ocean side, (2) fresh water on the island itself, and (3) brackish water on the marsh or bay side of the island; and each is affected by human activity on the island.

Of the three, the ocean water is obviously the most plentiful and the least affected by man's activities on the island. These waters, however, are easily polluted by activities on the mainland, on the islands themselves, and at sea.

Fresh water naturally occurs on an island as a result of local precipitation falling directly on the island; there is no watershed. The rate of fresh water replenishment is governed by the island's limited precipitation and catchment area. The plants that live on the dunes and flats require fresh water, which is normally available to them in two ways. First, the dunes--although dry on the surface--hold sufficient moisture within to support the plants. Second, the water table is usually quite close to the surface of the barrier flats, within reach of the plant roots enabling them to get sufficient moisture. The water demand of a community development located on a barrier island is usually greater than the rate of replenishment. In some communities where well water is used, an imbalance between demand and replenishment causes an overdraft on the limited groundwater supply. This overdraft not only means a depletion of the fresh water supply, but the incursion of subterranean salt water bringing unuseable brackish water into the wells. Barring the availability of a deep acquifer, the only alternative for a permanent development is to pipe water from the mainland causing the cost of fresh water to be 4 to 5 times more expensive than on the mainland.

The upper surface of the fresh ground water is in many places at or near the ground surface. This condition, combined with sandy soils, makes it difficult to install septic systems and drain fields. Not only is the septic drainage impeded by the saturated condition of the soil, there is always the possibility of the waste discharge mixing with the fresh water supply. It becomes clear that the water regime of many barrier islands imposes severe limitations. Storm damage, too, causes many problems. Hurricane Beulah cut the Padre Island water line in more than 40 places. Although water limitations are severe in most cases, many of the study units maintained a potable water supply. Only 43 (14%) of the nearly 300 study units do not have a potable water supply. Table 8 identifies the number of units by State without a potable water supply.

The third form, the brackish water, is extremely valuable as a fishery and for its production of vast quantities of seafood. With its protected waters, its recreational value is also undoubted, as these waters support numerous marinas and waterfront subdivisions. It must be remembered, however, that this brackish water is itself an ecosystem of finely tuned associations of fresh water, salt water, transported nutrients and a variety of plant and animal species. The plants and animals are conditioned to and depend upon the natural ambient conditions, including the flux of salinity, the seasonal changes of temperature or dissolved oxygen, and, especially, the protection offered by the barrier islands from major storm winds and tides. These water bodies are fragile in the sense that they do not require too serious an intrusion to upset the natural dynamic balance.

Water quality on and around the barrier islands is also a critical issue. Industry has the potential for hazardous effects on water quality. Discharges of pollutants into the water can result in severe alteration of the biological and scenic resources. The coastline from Long Island, New York, to Cape Hatteras, North Carolina, has been heavily impacted by the dense population and industrialization of the coast from Washington to New York. New York Harbor, the Delaware Bay and the Chesapeake Bay have undergone considerable degradation especially from municipal waste discharge, toxic waste disposal, dumping of sewage sludge and coastal modification.

Construction facilities related to the production of energy have caused conflicts along the coastal area. The increased number of oil spills, the risk of nuclear accidents as well as the great quantities of water utilized for cooling purposes, pose serious damage to the water quality surrounding the barrier island.

Table 8

Study Units Without Potable Water Supply

State	Total # of Units	# of Units Without Potable Water Supply
Alabama	5	1
Florida	80	13
Georgia	15	2
Louisiana	18	8
North Carolina	23	6
South Carolina	35	9
Virginia	11	4

Other coastal activities also cause contamination. For example, the developments associated with marinas or waterfront subdivisions leak gas and oil; pesticide and fertilizer contaminates runoff into the water; and fresh water from rain or snow, which would have percolated into the subsoil, now runs off on newly paved surfaces into the marshes and is lost to the freshwater lens.

Approximately $4 million in Federal funds were appropriated for research and study related to water quality in Fiscal Year 1978. The Corps of Engineers and the National Oceanic and Atmospheric Administration account for 82% of those funds. Research into excessive sediment deposition caused by the disposal of dredged material in the sea is one of the areas being funded.

H. Cultural Features

In the history of this Nation, barrier islands have played a role of significant historic and cultural importance. Not only were they long used and occupied by Native Americans, these outer banks were often the first land sighted by the arriving European explorers, and later became the homes of early settlers. Settlements on some of the barrier islands have survived until the present, and they and their inhabitants have often retained distinguishing cultural characteristics of earlier times recognizable in language patterns, life styles, building techniques, and attitudes.

The islands were (and in some cases still are) important for the location of lighthouses, vital for warning sailors of the nearby shoals and in helping them to determine their position. Today there are active and inactive lighthouses that date back as far as 1765 exhibiting the wide range of designs, construction techniques, and building materials that characterized this architectural form. A closely related aid to coastal navigation that became a cultural feature of the islands was the chain of lifesaving stations created to aid seamen in distress. A number of the stations still exist. Another use of the barrier island, related to their forward location, was that of coastal defense. Ship Island, Mississippi; Santa Rosa Island, Florida; and Sandy Hook, New Jersey, are but three examples of barrier islands that still contain substantial remnants of fortifications that span a long period of American History.

Although much of the physical evidence of successive occupation and use has been lost to erosion and storms, much remains. This is quite evident in a study of both the prehistoric and historic archeological resource potential for onshore and offshore coastal areas of the Gulf of Mexico prepared in 1977 under the auspices of the Interagency Archeological Services, Office of Archeology and Historic Preservation.

As an indication of the important role the islands have played in American culture, the National Register of Historic Places was reviewed in an attempt to identify a list of historic properties located on barrier islands. The seventy-six properties identified have been listed on the National Register of Historic Places, as of October 1978. These sites include seven military fortifications, six colonial settlements, thirty-one historic structures, eleven lighthouses, three lifesaving stations, two railway depots, one spanish monastery and one sunken ship (Table 9). Three of these sites have been determined to be very significant and as such have been designated National Historic Landmarks. Nine prehistoric and historic Native American sites were also identified. The National Natural Landmarks Program, which identifies physical and biological resources that possess attributes of national significance, was also reviewed to determine the number of sites listed on barrier islands. Seventy-three sites on 68 barrier island study units were listed; of these, 17 have been officially designated as Natural Landmarks by the Secretary of the Interior. Of the 73 sites, many were noted for specific outstanding natural attributes. Included were: 51 for tidal marshes, 41 for maritime forests, 39 for dune communities, 38 for raptor habitats, 36 for rare species habitats. Table 10 identifies the number of landmarks studied and those already designated by States.

The Historic Preservation Fund, administered under the authority of the National Historic Preservation Act of 1966, makes matching grants for historic preservation to the States from an annual appropriation for that purpose. The States may use the grants for surveying, evaluating, acquiring, and preserving significant cultural resources. Since the program was first funded in 1970, over $46,625,000 have been granted to the 18 barrier island States through FY 1978. Considerably less than 1% of this amount is estimated to have been used to promote resource preservation on barrier islands.

I. Recreation

Barrier islands offer a wide range of recreational opportunity including: fishing, clamming, swimming, hunting, scuba-diving, camping, hiking, wildlife observation, environmental study, picnicking, bicycling, and nature walks located in areas such as national seashores, wildlife refuges, parks, and natural areas. Cultural areas such as those designated in the National Natural Landmarks program are important recreational resources as well. Barrier islands also provide, where developed, a deluxe resort atmosphere with motels, restaurants, gift shops, amusement parks, marinas, golf courses, tennis courts, and swimming pools. Barrier islands offer an unlimited opportunity for the recreationist whether he or she lives nearby or travels a great distance.

Visitor characteristics of seashore users are diverse. General observations, however, indicate that family groups most often use the shorelines along with a large number of organized groups. The visitor profile is often influenced by national and regional conventions and

Table 9

Number of Registered Historic Places
By State

State	Number of Barrier Island Units With Registered Places	Number of Registered Places
Maine	2	3
Massachusetts	3	3
Rhode Island	1	3
New York	1	1
New Jersey	5	8
Virginia	2	2
North Carolina	2	3
South Carolina	5	19
Georgia	3	6
Florida	13	21
Alabama	1	1
Mississippi	1	1
Louisiana	1	1
Texas	3	4
Total 14	43	76

Table 10

National Natural Landmarks by State

State	Number of Barrier Island Units With Landmarks	Number of Currently Identified Landmarks	Number of Designated Landmarks
New Hampshire	2	2	
Massachusetts	13	13	1
Rhode Island	1	1	
New York	6	6	1
New Jersey	4	6	1
Delaware	2	2	
Virginia	10	10	10
North Carolina	5	6	2
South Carolina	6	6	
Georgia	10	11	1
Florida	7	8	1
Louisiana	2	2	
Total 12	68	73	17

conferences. Visitation to the coastal shorelines is influenced by several factors, namely, proximity to urban centers, accessibility, and public familiarity.

Visitation to the national seashores administered by the National Park Service is one of increasing importance. For example, in 1956, three years after its establishment as the first national seashore, Cape Hatteras received nearly 300,000 visitors. In 1976, approximately 1,800,000 visits were recorded there, a 500% increase over the twenty-year period. Table 11 reports visitation occurrences during the past three recreation seasons. The trend is still one of growth.

It is becoming more apparent that the large numbers of vacationers and tourists are overtaxing the capacities of some of these delicate coastal resources. As the trend continues to develop toward the sea, the supply and longevity of public coastal recreational areas become more uncertain.

Coastal recreational activities play a major role in all the Atlantic and Gulf States. Table 12 identifies the activities by State which are of major attraction. These States, although recognizing the recreational value of the barrier islands, do not include them in their statewide comprehensive outdoor recreation planning efforts. Seventeen of the eighteen coastal states have utilized the Land and Water Conservation Fund (LWCF) for recreational purposes on barrier islands. Through November 1977, there were approximately 112 (LWCF) projects on 74 study units.

J. Public Lands on Barrier Islands

The total acreage administered by public agencies on the nearly 300 barrier island units amounts to 645,252 acres. Of this, 438,770 acres are federally managed, 177,077 acres are managed by State agencies, and 29,404 acres are managed by county or local agencies.

The vast majority of Federal lands are administered by the National Park Service in 12 barrier island units and the Fish and Wildlife Service (Table 13) in 31 barrier island refuges (Figure 11). Lesser amounts are administered by the Bureau of Land Management, General Services Administration, Department of Defense, and others.

State-administered recreation and fish and wildlife refuge units are located on 69 of the barrier island study units (Table 14). The acreages include only "fast", or dry, land portions of the study units. Inclusion of all wet or submerged lands would, obviously, substantially increase the numbers.

K. Land Use

Table 15 shows land use and land cover changes, by State, on most of the barrier island units where information was available for the period 1950 to 1973-74. Seven land uses or classes of cover are listed.

Table 11

Annual Visits to National Seashores

(in 000's)

Area	1976	1977	%	1978	%
Assateague Island	1,866.2	1,939.2	3.9	2,135.9	10.1
Canaveral	715.4	845.9	18.2	882.6	4.3
Cape Cod	5,018.7	5,348.9	6.6	5,025.9	6.0
Cape Hatteras	1,817.2	2,036.0	12.0	2,043.3	.3
Cape Lookout	26.9	45.4	68.8	54.3	19.6
Cumberland Island	17.8	25.1	41.0	36.4	45.0
Everglades National Park	1,032.6	1,067.8	3.4	1,136.1	6.4
Fire Island	702.2	633.1	-9.8	537.1	.6
Gateway National Recreation Area	9,631.4	9,210.6	-4.4	9,017.5	-2.0
Gulf Island	2,375.3	2,925.5	23.2	3,971.6	35.8
Padre Island	968.1	842.2	13.0	867.0	2.9
Wright Brothers National Memorial	505.1	535.1	5.9	483.5	-9.6
Totals	24,676.9	25,454.8	3.2	26,291.2	3.3

Table 12

Major Recreation Activities

by State

State	Activities
Alabama	sport fishing
Connecticut	swimming
Delaware	swimming - camping - fishing
Florida	beach activities - salt water fishing - boating
Georgia	fishing - swimming - boating
Louisiana	fishing/hunting - boating - picnicking
Maine	beach activities
Maryland	boating
Massachusetts	beach activities
Mississippi	beach activities
New Hampshire	beach activities
New Jersey	beach activities
New York	boating
North Carolina	camping - swimming - surf fishing
Rhode Island	swimming - boating - picnicking
South Carolina	swimming - camping
Texas	sightseeing - hunting - fishing
Virginia	beach activities

Table 13
U.S. Fish and Wildlife Service

National Wildlife Refuges on Coastal Barrier Islands1/

State	Refuge	Location (CBI Study Unit(s))	Date Established	Total Refuge Area2/ (acres)	Est. Beach Length3/ (miles)	Wilderness Designation Status4/	Wilderness Designation Area (acres)	FY 1978 Public Use (000's) Activity Hours Education/ Interpretation	Other Mission Related Use	Non-mission Related Use	Total	Total Visits
ME	Rachel Carson	ME0-09	12/31/66	3,060	—	5/	—	*	8	*	8	9
MA	Parker River	MA02	12/30/42	4,650	6.5	Proposed7/	3,110	63	923	275	1,262	439
	Monomoy	MA10	06/01/44	2,702	8.5	Established 8/	2,420	6	105	10	121	26
	Nantucket	MA23	05/01/73	40	0.4	5/	—	—	1	1	2	1
RI	Trustom Pond	RI02	08/15/74	365	0.5	5/	—	3	4	24	31	13
	Ninigret	RI04	08/12/70	28	0.2	5/	—	—	1	*	1	1
	Block Island	RI09	11/01/73	29	0.3	5/	—	—	4	1	5	4
NJ	Brigantine	NJ03-06	10/05/39	20,197	6.1	Established9/	6,681	154	218	13	385	151
MD/VA	Chincoteague	MD03-VA01	05/13/43	9,439	13.3	Proposed7/	1,300	186	1,137	593	1,916	1,221
VA	Wallops Island	VA05	03/11/71	3,373	3.5	5/	—	13/	13/	13/	13/	13/
	Fisherman Island	VA10	01/17/69	1,025	2.1	5/	—	13/	13/	13/	13/	13/
	Back Bay	VA12	06/06/38	4,589	4.2	Proposed7/	2,165	5	51	12	68	43
NC	Pea Island	NC03	04/08/38	5,915	12.9	Proposed7/	180	14	999	131	1,144	1,037
SC	Cape Romain	SC14-16	06/01/32	34,22	19.1	Established9/	29,000	14	114	—	128	93
GA	Tybee Island6/	GA01	05/09/38	100	0.6	Not qualified (CE owns land)	—	—	1	*	1	*
	Wassaw	GA04	10/20/69	10,070	5.4	5/	—	3	42	19	64	18
	Blackbeard Island	GA07	02/15/24	5,618	7.4	Established9/	3,000	*	98	*	98	11
	Wolf Island	GA10-11	04/03/30	5,126	3.9	Established9/	5,126	—	10	—	10	2

U.S. Fish and Wildlife Service

National Wildlife Refuges on Coastal Barrier Islands (continued)1/

State	Refuge	Location (CBI Study Unit(s))	Date Established	Total Refuge Area2/ (acres)	Est. Beach Length2/ (miles)	Wilderness Designation Status4/	Wilderness Designation Area (acres)	FY 1978 Public Use (000's) Activity Hours: Education Interpretation	Other Mission Related Use	Non-mission Related Use	Total	Total Visits
FL	Merritt Island	FL08	08/28/63	139,305	--	Not Qualified (NASA Owns Land)	--	600	1,656	1,603	3,[illegible]	3,[illegible]
	Pelican Island	FL10	03/14/03	4,350	--	Established8/	6	3	50	1	73	30
	Hobe Sound	FL12	08/23/68	983	3.0	5/	--	11	114	36	161	86
	J.N. "Ding" Darling	FL19	12/01/45	4,833	0.5	Established10/	2,619	373	753	96	1,222	109
	Pine Island	FL21	09/15/08	30	--	Not qualified (ownership uncertain)	--	14/	14/	14/	14/	14/
	Passage Key	FL20	10/10/05	36	0.4	Established8/	20	14/	14/	14/	14/	14/
	Egmont Key	FL21	07/10/74	328	1.3	5/	--	14/	14/	14/	14/	14/
	Cedar Keys	FL41-43	07/16/29	379	3.6	Established11/	375	33	3	--	36	7
	St. Vincent	FL47	03/13/68	12,490	8.6	5/	--	1	67	*	68	5
LA	Breton	LA01, 03	10/04/04	9,047	27.0	Established9/	5,000	--	30	*	30	1
TX	[illegible]	TX01	02/01/79	8,997	5.0	5/	--	--	--	--	--	--
	San Bernard	TX08	11/03/68	24,412	6.7	5/	--	*	25	3	28	7
	Aransas	TX10	12/31/37	73,835	26.8	Not qualified (mineral/oil gas rights outstanding)	———	115	379	--	494	123
	Totals			385,382	17[illegible].9		61,003	1,233	6,643	2,973	10,861	9,409

1/ Includes refuges which are located in CBI Study Units.
2/ As of September 30, 1978, or, if established later, as of date established.
3/ There is some question as to whether this island is located in South Carolina or Georgia.
4/ Four categories are recognized: 1) not qualified (not an island, less than 5,000 acre roadless area, FWS does not own fee title to the land or other reasons as noted); 2) considered, but found unsuitable; 3) proposed (date sent to Congress indicated); and 4) established (public law number, date approved indicated). Not all or, in some instances, any of a wilderness area is within the CBI Study Unit.
5/ Refuge established after 1964 Wilderness Act enacted, hence, it has not been considered for wilderness status.
6/ Part of joint FWS-NPS Assateague Island wilderness proposal. NPS portion totals 640 acres and is located in Maryland. FWS portion totals 1,300 acres and is located in Virginia.
7/ Submitted to Congress December 4, 1974.
8/ Established by P.L. 91-504, approved October 23, 1970.
9/ Established by P.L. 93-632, approved January 3, 1975.
10/ Established by P.L. 94-557, approved October 19, 1976.
11/ Established by P.L. 92-364, approved August 7, 1972.
12/ Satellite station. Public use information under Chincoteague NWR.
13/ Satellite station. Public use information under Back Bay NWR.
14/ Satellite station. Public use information under J.N. "Ding" Darling NWR.

*Less than 500.

Table 14

State Owned Barrier Islands

Note: The following list of State-owned and administered barrier islands is approximate, both in terms of the areas listed and the acreages. Acreage is an approximate figure; for some units it may include only dry land, while in others it includes water areas on the bay or ocean side that are within the boundaries. The list is intended only for purposes of comparison.

	BARRIER ISLAND STUDY UNIT	#	STATE AREA	ACREAGE
Maine	Sheepscot	01	Reid State Park	400
	Popham Beach	02	Popham Beach State Park	310
Massachusetts	Salisbury	01	Salisbury Beach State Reservation	150
	Plum Island	02	Plum Island State Park	100
	Horseneck Beach	27	Horseneck Beach State Reservation	1,800
Rhode Island	Charlestown	01	East Matunuck State Beach	171

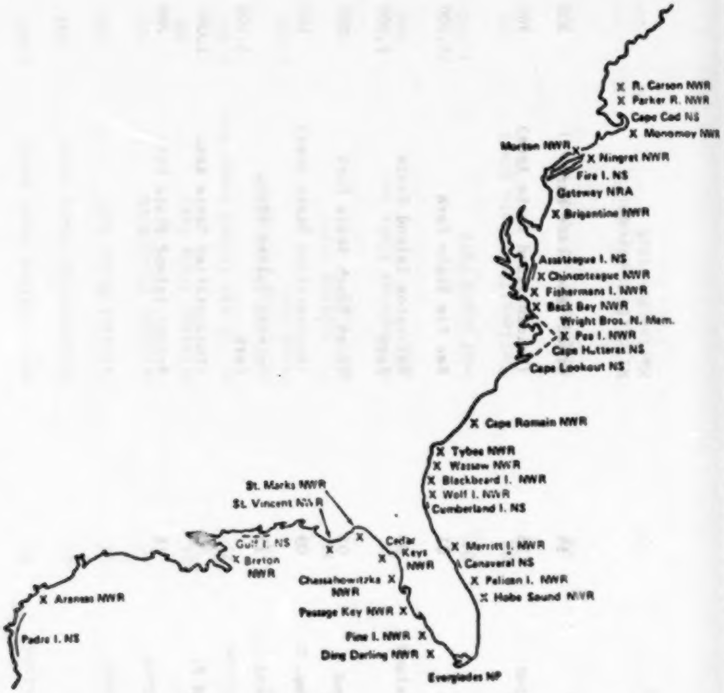
			Ninigret Management Area	174
			Quonochontaug Management Area	50
Connecticut	Hammonasset Point	01	Hammonasset Beach State Park	900
New York	Orient Beach	07	Orient Beach State Park	400
	Fire Island	12	Robert Moses State Park	1,000
	Jones Beach	13	Gilgo Beach State Park, Jones Beach State Park	3,000
New Jersey	Barnegat	02	Island Beach State Park	2,600
	Ocean City	07	(Unidentified State Area)	200
	Seven Mile Beach	09	(Unidentified State Area)	300
Delaware	Rehoboth	01	Cape Henlopen State Park Delaware Seashore State Park	1,500
	Fenwick Island	02	Delaware Seashore State Park	500
Maryland	Assateague North	02	Assateague Island State Park	700

Virginia	Wreck Island	09	State Natural Area	Part of Group
	Mockhorn Island	09	(Unidentified State Area)	Part of Group
North Carolina	Bogue Banks	08	Ft. Macon State Park	3,900
	Hammock Island	09	Hammock Beach State Park	2,000
	Masonboro Island	16	Carolina Beach State Park	3,700
	Carolina Beach	17	Masonboro State Park	1,600
	Smith Island	18	(Unidentified State Area)	500
South Carolina	North Island	05	State Wildlife Refuge	4,200
	South Island	06	State Wildlife Refuge	2,900
	Cedar Island	07	State Wildlife Refuge	4,100
	Murphy Island	08	State Wildlife Refuge	8,000
	Capers Island	12	State Wildlife Refuge	3,400
	Edisto Island	22	Edisto Beach State Park	1,300
	Hunting Island	25	Hunting Island State Park	1,700
	Turtle Island	33	State Wildlife Refuge	1,700

Georgia	Sapelo Island	08	State Wildlife Refuge Duplin R. Est. Sant.	13,500
	Jekyll Island	13	Jekyll Island State Park	6,000
Florida	Amelia	01	Ft. Clinch State Park	1,000
	Little Talbot	03	Little Talbot Island State Park	2,500
	Anastasia Island	05	Anastasia State Park, Butler State Park	9,000
	Matanzas Island	06	Washington Oaks Gardens State Park	200
	Flagler Island	07	Flagler Beach State Park	200
	Vero Beach Island	11	Jack Island State Park	200
	Ft. Lauderdale	18	Birch State Park	100
	Key Biscayne	22	Cape Florida State Park	300
	Naples Park	34	(Unidentified State Area)	100
	North Captiva Island	41	(Unidentified State Area)	400

	Cayo Costa Island	42	(Unidentified State Area)	1,600
	Manasota Key	45	(Unidentified State Area)	100
	Caladesi Island	59	Caladesi State Park	700
	Honeymoon Island	60	Caladesi State Park	700
	Anclote Keys	61	Caladesi State Park	200
	St. George Island	71	St. George Island State Park	1,000
	Cape San Blas	74	St. Joseph Peninsula State Park	3,000
	Shell Island	76	St. Andrews State Rec. Area	400
	St. Andrews	77	St. Andrews State Rec. Area	200
Alabama	Romar Beach	02	Gulf State Park	1,000
	Mobile Point	03	(Unidentified State Area)	200
Louisiana	Grand Gosier Island	02	(Unidentified State Area)	370
	Grand Terre Island Group	13	Wildlife Management Marine Research	200

	Grand Isle	14	Grand Isle State Park	500
	East Timbalier Island	16	(Unidentified State Area)	900
Texas	High Island	01	Sea Rim State Park	15,000
	Galveston Island	03	Galveston Island State Park	2,000
	Brazos Island	05	Bryan Beach State Park	500
	Matagorda Pen. W.	09	(Unidentified State Area)	100
	Mustang Island	12	Mustang Island State Park	3,500
	Padre Island N.	13	(Unidentified State Area	2,000
	Boca Chica	16	Brazos Island State Park	200


R. Carson NWR
Parker R. NWR
Cape Cod NS
Monomoy NWR
Morton NWR
Ningret NWR
Fire I. NS
Gateway NRA
Brigantine NWR
Assateague I. NS
Chincoteague NWR
Fishermans I. NWR
Back Bay NWR
Wright Bros. N. Mem.
Pea I. NWR
Cape Hatteras NS
Cape Lookout NS
Cape Romain NWR
Tybee NWR
Wassaw NWR
Blackbeard I. NWR
Wolf I. NWR
Cumberland I. NS
Merritt I. NWR
Canaveral NS
Pelican I. NWR
Hobe Sound NWR
Everglades NP
St. Marks NWR
St. Vincent NWR
Cedar Keys NWR
Gulf I. NS
Breton NWR
Chassahowitzka NWR
Passage Key NWR
Pine I. NWR
Ding Darling NWR
Aransas NWR
Padre I. NS

Locations Of Barrier Island
Related Units Of The NPS & FWS
Figure. 11

Table 13

Land Use or Land Cover

State	Year	Urban Acres	Urban % of Total	Agriculture Acres	Agriculture % of Total	Range Acres	Range % of Total	Forest Acres	Forest % of Total	Water Acres	Water % of Total	Wetland Acres	Wetland % of Total	Barren Acres	Barren % of Total	Total
Alabama	1950	-		-	-	-	-	4301	16.2	3398	12.8	13288	50.2	5494	20.8	26481
	1973-4	5273	18.7	-	-	2130	7.5	6931	24.8	3083	11.0	6487	27.7	4049	14.3	28213
Connecticut	1950	264	21.5	-	-	-	-	-	-	-	-	778	63.4	195	15.9	1227
	1973-4	376	42.4	-	-	-	-	-	-	-	-	563	41.5	218	16.1	1357
Delaware	1950	1907	15.0	101	1.0	-	-	606	6.0	114	1.1	5711	56.6	1957	19.4	10136
	1973-4	2956	29.2	26	0.2	-	-	64	0.6	262	2.6	4115	40.7	2655	26.3	10111
Florida	1950	32423	6.3	2606	0.5	279	0.1	25812	5.0	39962	7.8	338304	66.2	71970	14.1	511356
	1973-4	101198	19.7	2437	0.5	1260	0.2	56001	10.8	73759	14.2	264291	47.1	38657	7.5	518423
Georgia	1950	5161	3.0	1116	0.7	4724	2.8	43377	25.4	3297	1.9	106786	62.3	6774	3.9	171235
	1973-4	8436	4.9	1459	0.9	3950	2.3	42375	24.7	3903	2.3	103351	60.3	7944	4.6	171418
Louisiana	1950	1651	4.5	-	-	-	-	-	-	1419	3.8	26447	71.2	7611	20.5	37128
	1973-4	6746	17.5	-	-	-	-	-	-	1504	3.9	24030	62.4	6238	16.2	38518
Maine	1950	593	36.0	-	-	105	6.4	206	12.5	-	-	531	32.2	213	12.9	1648
	1973-4	1165	71.6	-	-	-	-	84	5.2	-	-	239	14.7	134	8.3	1622
Maryland	1950	820	6.8	-	-	-	-	484	4.0	180	1.5	6413	53.3	4128	34.3	12025
	1973-4	1840	13.7	-	-	-	-	601	4.5	160	1.2	5975	44.5	4856	36.2	13424
Massachusetts	1950	4399	13.2	11	0.1	4793	14.8	1310	3.6	528	1.5	9608	28.0	13511	37.4	36283
	1973-4	8128	21.5	70	0.2	4484	11.8	1220	3.2	588	1.5	8900	23.6	14427	38.2	37761
Mississippi	1950	-	-	-	-	-	-	-	-	-	-	5946	61.4	3732	38.6	9678
	1973-4	-	-	-	-	-	-	179	1.8	-	-	5964	61.4	3584	36.8	9727
New Hampshire	1950	467	46.1	-	-	-	-	-	-	-	-	546	53.9	-	-	1013
	1973-4	780	72.1	-	-	-	-	-	-	-	-	301	27.9	-	-	1081
New Jersey	1950	17746	37.4	85	0.2	-	-	1323	2.8	1603	3.4	13701	[illegible]	[illegible]	[illegible]	[illegible]
	1973-4	22719	47.4	358	0.8	-	-	627	1.3	1816	3.8	13225	27.6	9172	19.1	47917
New York	1950	8140	27.2	358	1.2	1536	5.1	2228	7.5	357	1.2	7495	25.0	9813	32.8	29927
	1973-4	11578	35.0	273	0.8	1580	4.8	1508	4.5	350	1.1	7488	22.4	10171	30.7	33148
North Carolina	1950	5862	3.9	-	-	-	-	14686	9.7	1418	0.9	88922	58.6	40842	26.9	151730
	1973-4	21625	13.9	-	-	-	-	12327	7.9	1274	0.8	78202	50.3	42091	27.1	155429
Rhode Island	1950	773	23.3	186	5.5	153	4.6	76	2.2	243	7.3	1334	40.1	566	17.0	3327
	1973-4	1226	34.8	246	7.0	153	4.6	162	4.6	213	6.0	1430	40.6	94	2.7	3524
South Carolina	1950	1654	1.1	9766	6.3	-	-	26133	16.9	1735	1.1	107802	69.6	7792	5.0	154882
	1973-4	13081	8.5	5152	3.3	-	-	24996	16.2	2178	1.4	100949	65.3	8241	5.3	154597
Texas	1950	9244	2.5	65	0.02	89127	23.6	816	0.2	9503	2.5	187855	49.8	80345	21.4	377162
	1973-4	19410	5.3	88	0.02	85305	23.5	1152	0.3	9631	2.7	186158	51.2	61623	17.0	363367
Virginia	1950	-	-	-	-	-	-	3660	5.4	2356	3.5	51703	77.2	9598	14.3	67317
	1973-4	1144	1.6	51	0.1	-	-	4487	6.5	2327	3.3	46404	67.5	14505	21.0	68918
TOTALS	1950	92226	5.6	14295	1.0	100705	6.0	125306	8.0	66212	4.0	975130	59.0	275492	16.0	1647966
	1973-4	228679	14.0	10160	0.6	98812	6.0	132782	9.0	101240	6.0	838392	50.1	228656	13.8	1658721

Figures developed by the U.S. Geological Survey from aerial photograph interpretations for barrier islands located in the 18 States indicate that between 1950 and 1973, lands on the islands categorized as urban increased by over 137,900 acres or 142% as compared to a national increase of about 90%. Although substantial portions of this increase can be attributed to a few specific island developments, tangible increases in development have occurred on nearly all islands having "urban" acreage in 1950. Also, about 40 islands which had no urban acreage in 1950 had varying amounts in that category by 1973. Approximately 14% of the total barrier island acreage is urbanized as compared to 3% for the Nation as a whole. The rate at which barrier islands are urbanizing is about twice that of the Nation as a whole.

These data were prepared by the Geography Program, Land Information Analysis Office, U.S. Geological Survey, Reston, Virginia, during the spring of 1978.

Land use problems form a continuum involving the degree of public and private ownership of coastal land and the use of this land. At one extreme is the need to ensure easy access to publicly owned beaches through privately owned beach property if necessary. The other end of the continuum involves conflicting uses of private property which degrade and destroy either public recreational facilities, the barrier island ecosystem, or both. A corollary problem is the matter of locating public recreational resources in relation to concentrations of potential users.

Some 738,156 acres of the barrier islands are undeveloped/unprotected, about 46% of the total area of the study units. A substantial amount of this land is considered undevelopable because of susceptability to flooding or frequent overwash, high erosion factors, wetland areas, or other natural conditions.

L. Transportation

The provision of facilities for the transportation of people, goods, and services to, from, and through the coastal zone is essential to the national interest. Furthermore, full utilization of the coastal natural resources in the production of goods and services as well as for recreation, habitation, and industrial locations are all dependent upon sound transportation systems.

The availability and the future development of transportation facilities on the barrier islands becomes a critical consideration if the barrier island resources are to be protected. Since barrier islands are most readily acccssible by automobile, existing and future highway systems have the most direct impact on island resources. In addition to the immediate adverse effects of construction, increased traffic and pollution of the ecosystem are problems that come with easy access to the barrier islands as people from nearby urban centers follow the natural tendency towards the sea for the pursuit of leisure activities.

Few of the barrier islands have airport facilities and only a small number support a ferry service. However, of the approximately 300 study units, 175 (58%) have direct road access, a causeway, or a bridge connection. Table 16 depicts the types of access available on the study units according to State.

H. Socio-Economic Factors

Since the barrier island study encompasses the Atlantic and the Gulf Coasts, the eighteen respective coastal States comprise the broadest region for which socio-economic data were analyzed. Additionally, the 108 coastal counties which border the Atlantic and the Gulf Coasts, including all or portions of the inventoried barrier islands, are also analyzed in some detail to provide a more localized perspective.

The intent of analyzing the State and county data was to provide some general description of the coastal area. Since most of the islands could not be identified within a particular census tract, complete socio-economic data by island was unavailable. It is important to recognize, however, that the State and county analysis does not always depict the socio-economic values occurring on the barrier islands. Generally, due to the extent of the recreation-tourist development, second home development, and private ownership, the socio-economic factors of the islands themselves would reflect a different socio-economic structure.

Much of the socio-economic data presented in this section has been compiled by the Bureau of the Census and taken from the County and City Data Book of 1977. Table 17 provides a comparison of several socio-economic factors at the State and local levels and the national perspective.

1. Economy

Nearly one-third of the approximately 300 barrier island study units support substantial developments; in some cases, major cities like Atlantic City, New Jersey; Miami Beach, Florida; and Galveston, Texas. In addition, the industrial-commercial activity within the coastal area is enormous, as is its onshore and offshore production of fossil fuels, other mineral resources and the fisheries. There is no doubt that the cost of protecting these types of developments and resources is ever increasing; likewise, so is the potential for economic disaster.

As of March 1977, 7.8 million acres of coastal and offshore area were held under active lease for petroleum production; more than 42% are now producing. As of February 1979, there were more than 16,000 exploration and development wells drilled in the Gulf of Mexico.

Fishing is a lucrative commercial industry, as well as a recreational activity, in the offshore portion of the coastal zone. Among the common target species for both sport and commercial fishermen are those listed in Table 18. In 1976, the multimillion dollar Gulf States offshore fishing industry accounted for 33% by weight and 29% by value of total U.S. fisheries, second only to the Peruvian Coast in worldwide fishery

Table 16

Types of Access To Study Units*

State	# of Units	Airport	Bridge	Boat	Ferry	Undeveloped
Alabama	5		4	1		1
Connecticut	14		10	1		3
Delaware	2		2			
Florida	80	2	52	5	2	25
Georgia	15	2	4		2	9
Louisiana	18	1	2	1		16
Maine	9		9			
Maryland	2		2			
Massachusetts	27		21		2	4
Mississippi	5			1		5
New Hampshire	2		2			
New Jersey	10		9		2	
New York	15		13		2	
North Carolina	23		12		8	5
Rhode Island	6		4		1	1
South Carolina	35	1	12		3	19
Texas	16	3	13	3	2	2
Virginia	11		4			7
Totals	295	9	175	12	24	97

* Note: One unit may have more than one type of access.

Table 17

A Comparison of Socio-Economic Data

FACTORS	BARRIER ISLAND COUNTIES (108)	BARRIER ISLAND STATES (18)	UNITED STATES
1970 Population	19 797 000	85 497 000	203 304 000
-Percent Urban	84	68	74
-Percent Change ('60-70')	30.8	14.9	13.4
1975 Population	21 691 000	90 282 000	213 000 000
- Percent Over 65	12.3	10.3	10.5
Density Per Square Mile	278	293	60
Percent Change ('70-75')	9.6	5.6	4.8
-Natural Increase	1.9	3.3	3.6
-Migration	7.7	2.3	1.2
Percent 1969 Income Below Poverty Level	16.4	12.8	10.7
Percent 1970 Unemployment Rate	4.2	3.9	4.4
1974 Per Capita Income	4015	4358	4572
1967-1972 Percent Change--Retail Sales	77.0	102.0	48
1960-1970 Percent Change--Housing	38.4	22.8	19.9
Governmental Per Capita Expenditure--FY 1971	$367.20	$373.90	$389.00
-Percent Education	53.9	50.5	45.7
-Percent Highways	5.8	5.8	5.9
-Percent Health/Hospitals	7.7	6.1	6.6
-Percent Welfare	2.7	4.2	8.3

Table 18

Fish Species Sought By Sport
And Commercial Fisherman
Atlantic and Gulf Coasts

Region	Northeast Atlantic (Main to New York)	Mid-Atlantic (New Jersey to North Carolina)	South Atlantic (South Caroline to Florida)	Gulf of Mexico
Offshore (Beyond 3 miles)	cod, pollock, porgies, haddock, boston mackerel, bluefish, blackfish, flounders, hake, ling, whiting, swordfish, tuna, sea bass	swordfish, tuna boston mackerel, bluefish, cod, hake, haddock, whiting, flounders, sea bass, pollock, porgies, ling, blackfish	snappers, groupers, king mackerel, swordfish, grunts, porgies, bluefish, tuna, flounders, sea bass	groupers, snappers, tuna, king mackerel, grunts, sea bass, bluefish, dolphin fish
Inshore (Shore and small boat fishing out to 3 miles)	blackfish, bluefish, stripped bass, hake flounders, smelt, shad, whiting sea bass, white perch, weakfish	weakfish, porgies, croakers, spot, spotted weakfish, shad, striped bass, bluefish, blackfish, white perch, sea bass	sea bass, grunts, channel bass, black drum, weakfish, spotted weakfish, flounders, pompano, groupers, snappers, coakers, striped bass, shad, white perch, spanish mackerel	channel bass, black drum, spotted weakfish, flounders, sea bass, groupers, snappers, cobia, spanish mackerel, bluefish, grunts

*Table compiled in Congressional Research Service document 77-203 EP, Recreation and the Coastal Zone, September 8, 1977.

yield. Of that catch, 97.5% are fish of estuarine-dependent species that spend all or part of their lives in estuaries such as those near and protected by barrier islands.

The condition of the estuaries is important to the commercial fishing industry because it is estimated that two thirds of the top-value Atlantic and Gulf Coast species of fish are directly dependent on conditions of the estuaries. Without the protection afforded the bay systems by the barrier islands, productivity would drop with obvious consequences to sport and commercial fishermen.

Sport fishing contributes a great deal to tourism. Between 1960 and 1970, the number of marine sport anglers increased from 6.3 million to 9.5 million respectively and their expenditures increased from $626 million in 1960 to an estimated $1.8 billion by 1975.

Coastal development has a significant bearing on the State and the regional economy. It creates an attraction which requires a need for many services. As a result, job opportunities flourish and income is generated from food and lodging services, gifts and souvenir shops, admission fees and a variety of entertainments. Although revenues are generated and community spirit is fostered, all too often the character of most developments changes as tax dollars are consumed for more highways, more parking lots, more marinas, and more lodging facilities.

Between 1967 and 1972, retail sales increased 77.0% at the county level and an amazing 102.0% at the State level. Four counties in Florida experienced an impressive 200% increase in retail sales: Collier - 203.1%; Pasco - 222.2%; Charlotte - 238.9%; and Citrus - 232.0%. According to the socio-economic data analyzed, the per capita expenditures for retail sales varied from approximately $.58 at the State level to $2.44 at the county level. (See Table 17).

Recreation and tourism is also a major industry along the Atlantic and the Gulf Coasts. Recreational expenditures of over $15 billion per year are concentrated in the coastal recreation market. Table 19 depicts the numbers of dollars generated from the recreational tourist industry for several coastal States.

2. Government Finances

Government expenditures were quite similar for both the State and county levels (Table 17). Direct per capita expenditures for fiscal year 1971 included an average $373.90 for the States, and $367.20 for the counties. A percentage breakdown of the per capita expenditures for education, highways, welfare, and health was fairly similar at both levels. Of particular interest is that State and county levels were somewhat higher than the national level for educational expenditure. The percentage of per capita expenditures for highways was identical for the State and county, 5.8%. The percentage of per capita expenditures for health and hospital care were 5.1% for the States and 7.7% at the county level.

Table 19

Annual Recreational Tourism Dollars Generated by State

State	Approximate Expenditures
New Jersey	3 billion
Mississippi	200 million
Florida	9 billion
South Carolina	900 million
Maryland	900 million
Delaware	200 million
Texas	5.3 billion
Massachusetts	600 million

3. Income

The percentage of family incomes below poverty level in 1969 was quite high at 16.4% at the county level; the State level was 12.8%. The unemployment rate in 1970 was very close on both State and county levels of comparison; 3.9% and 4.2% respectively. Nationally, the percentage of family income below poverty level was less than the State or county level, but the unemployment rate was higher. Per capita income in 1974 was $4,015 at the county level and $4,358 at the State level, both lower than the national average, but both State and county levels fell well below national expenditures for welfare.

4. Population

Between 1960 and 1970, population growth for the Nation increased by 13.4%. During the same time period, population growth increased by 30.8% in the coastal counties and by 14.9% in the coastal States. In six coastal counties, population increases of 100% or more between 1960 and 1970 were experienced. These were:

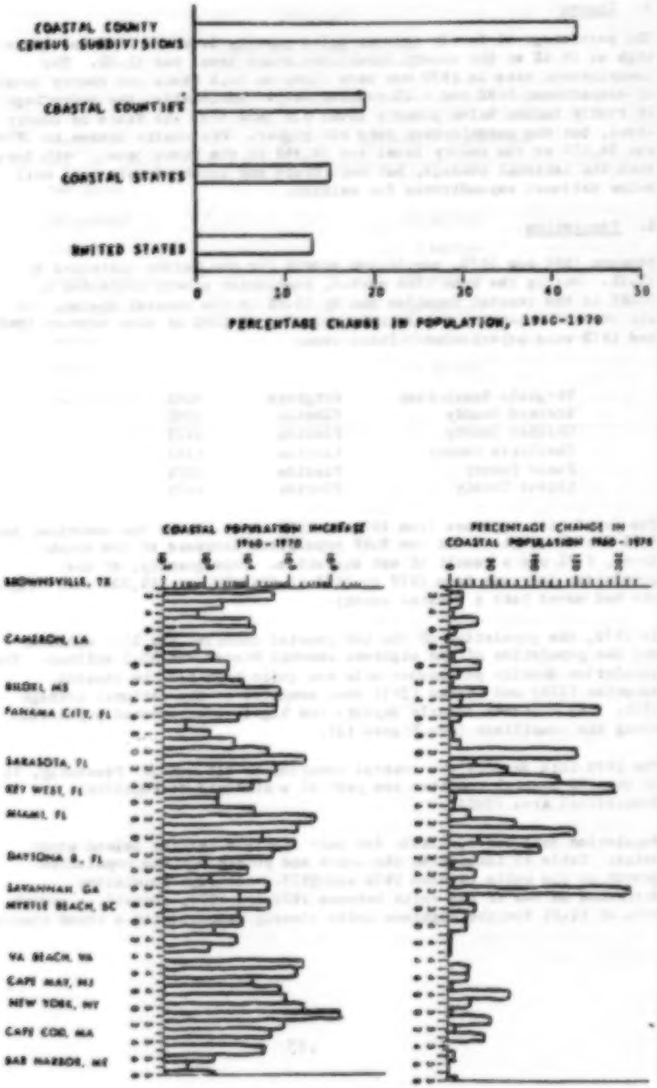
Virginia Beach City	Virginia	104%
Brevard County	Florida	106%
Collier County	Florida	142%
Charlotte County	Florida	119%
Pasco County	Florida	107%
Citrus County	Florida	107%

The population increase from 1970 to 1975 was 9.6% for the counties, and 5.6% for the States. Of the 9.6% population increase at the county level, 7.7% was a result of net migration. Consequently, of the population increase from 1970 to 1975 (1,894,000), 1,515,200 were people who had moved into a coastal county.

In 1975, the population of the 108 coastal counties was 21.7 million; and the population of the eighteen coastal States was 90.3 million. The population density per square mile was quite high for the coastal counties (278) and States (293) when compared to the national average (60). The contrast clearly depicts the highly concentrated population along the coastlines (See Figure 12).

The 1970 data depicts the coastal counties as 84% urban. Presently, 51 of the 108 coastal counties are part of a Standard Metropolitan Statistical Area (SMSA).

Population data was available for only eighteen barrier island study units. Table 20 identifies the units and points out the population growth on the units between 1970 and 1975. Although population decreased on two of the units between 1970 and 1975, overall, a growth rate of 11.2% for the eighteen units clearly demonstrates a trend toward



COASTAL POPULATION TRENDS
FIGURE. 12

Table 20

Population Trends on Several Barrier Island Study Units

State	County	Study Unit	1975 Population	1970 Population	%Change
New York	Nassau	Long Beach	33,123	33,127	no change
	Suffolk	Southampton	5,414	4,904	10.4
New Jersey	Atlantic	Atlantic City	43,969	47,859	-8.1
		Brigantine	7,979	6,741	18.4
	Cape May	Ocean City	12,808	10,575	21.1
		Wildwood	4,189	4,110	1.9
South Carolina	Charleston	Isle of Palms	2,961	2,657	11.4
Florida	Brevard	Cape Canaveral	4,712	4,258	10.7
		Cocoa (City)	15,544	16,110	-3.5
	Broward	Fort Lauderdale	152,959	139,520	9.6
	Dade	Miami Beach	94,063	87,072	8.0
	Indian River	Vero Beach (City)	14,680	11,908	23.3
	Palm Beach	Boca Raton	42,363	29,538	43.4
		Lake Worth	28,051	23,714	18.3
		Palm Beach	11,224	9,086	23.5
	Pinellas	Treasure Island	7,061	6,120	15.4
	Sarasota	Longboat Key	6,207	2,850	117.8
		Sarasota (City)	47,089	40,237	17.0
		TOTALS	534,396	480,456	11.2

locations near the sea. Currently, one of every four people in the United States lives within 100 miles of an East or Gulf Coast barrier island.

5. Housing

The recreational and scenic attractions of the ocean and inland coastal waters have and continue to induce high rates of residential and second home development near the water's edge. A large majority of this development is sprawled along the coastal shorelines including many of the barrier islands. The beachfront homesite is becoming more highly prized than ever before. Land values are seemingly boundless; for example, the cost per front foot of prime ocean property on Hilton Head Island, South Carolina, is $2,000.00 and on Key Biscayne, where homes increased in value 3 to 5 percent per year in the 1960's, both homes and condominiums are selling for 25 - 30 percent higher than a year ago. Such costs reflect an unparalleled demand for beach access.

A prime example of residential sprawling occurred at Rehoboth, Delaware. In 1938, less than one mile of the Rehoboth Bay shoreline and nine miles of the Indian River Bay shoreline were developed. By 1969, 25 miles of Rehoboth Bay's 48 miles were developed and 44 miles of Indian River Bay's 45 miles were developed, mostly with summer residences.

With respect to the socio-economic data analyzed (Table 17), year-round housing units developed at a high rate for the State but particularly at the county level. The percentage change in housing units from 1960 to 1970 for the county was 38.4%, the State 22.8%.

Only three counties experienced a negative growth rate for housing. These were:

Willacy County	Texas	-8.2%
Kenedy County	Texas	-9.6%
Suffolk County	Massachusetts	-1.0%

ENVIRONMENTAL CONSEQUENCES

This chapter describes the impacts on barrier islands which would result from implementation of each of the three alternative protection levels. Since no package of options has been selected as a preferred alternative, no impacts of a preferred alternative are presented.

Where practical, the impacts of the low level alternative have been quantified. However, implementation of many of the options in the remaining two alternatives will be dependent upon varying unpredictable influences and events. For instance, some of the options would be implemented only following a major storm or other disaster. It is not possible to predict the timing, location, or magnitude of the next, or subsequent, great storm(s). Further, it is not possible to predict or quantify the amount of damage that will take place in terms of life, property, and resource values lost; nor is it possible to accurately quantify the impact of an option which would be put into effect by such an occurrence.

Other options are totally dependent upon Federal agencies whose dedication to barrier island protection has not been meritorious thus far. Whether or not an option is implemented and how effective it would be depends on the extent to which the commitment and effort of the responsible agency can be redirected toward barrier island protection.

Once the moderate and high level alternative options are adopted and implemented into the responsible agency's programs, environmental consequences could be addressed more specifically and, where practical, quantified at that time. Essentially, however, the environmental consequences are correlative to the level of protection afforded: the greater the commitment to barrier island protection, the fewer alterations to and impacts on the natural environment will occur; while the human environment on barrier islands will undergo less urbanization and development, more opportunities for recreational experiences will be available.

Low Level (Current Effort) Alternative

This alternative will permit: the continued investment of money--both public and private--to develop barrier islands; an increasing number of seasonal and permanent residents; the placing of more and more people in hazardous situations; and, the deterioration or destruction of valuable barrier island ecosystems. However, evolving programs and attitudes concerning protection of the islands also will result in increased numbers of them being placed in protective status. Competition between public and private conservation organizations and private developers for the diminishing amount of "unprotected-undeveloped" barrier island acreage will intensify.

Under this alternative, barrier islands will continue to develop at the rate of about 6000 acres, or more, per year. Costly and frequently temporary flood proofing, erosion control, and beach nourishment projects which may provide short-term protection from storms will be proposed and constructed; the false sense of security engendered by them will be perpetuated. With some exceptions, low density summer home communities will convert to high density condominium development, as has happened at Rehoboth, Delaware; more areas will become urbanized, as has happened at Hammonasset Point, Connecticut, St.Andrews Island and others in Florida and Alabama; access to public beaches will be impeded, as at Ocean City, Maryland and Hilton Head, South Carolina; and, federally subsidized insurance and Federal disaster relief will help pick up the pieces and put them back together after major storms, as has happened along the Massachusetts coast following the severely damaging nor'easters of February 1978.

Local governments and private individuals will not be discouraged from gambling at the general public's expense that there will be no future storms or storm damage in places they select for barrier island development.

Even with the high priority given by FIA, without adequate funding, floodplain mapping will not be completed by the congressionally mandated date of 1983. As a consequence there could be delays of several years before all communities on barrier islands are covered in the regular phase of the flood insurance program. This is a critical event in that certain regulations and restrictions come into play once a community enters the regular phase of the program.

If there are no changes in current Federal programs and attitudes there will continue to be demands to expand, upgrade, and increase the densities of barrier island developments. The pressures which emanate from those demands may have a profound influence on the Federal program response to the basic issue of the extent to which barrier islands should be developed, if at all, and what the Federal role should be in encouraging or discouraging that development.

The overall end result of a no further action alternative is apparent. Barrier islands will continue to urbanize and the consequences will be increased:

o Loss of ecological and public recreation values

o Federal investment to protect developments

o Risk to life and property.

Natural Resources

Barrier islands are the product of extreme energy stress; the location, topography, geology, vegetation, soils - the entire natural system is determined and maintained by the ever present energy stress. Unimpeded, this natural process will continue indefinitely; only man's innovations and manipulation of the islands' natural processes can change the relationship between the islands and the forces on which they depend for survival.

As man's influence grows, the islands, as significant coastal features, will continue to be depleted of their natural resources. The results will be both intended and unintended physical changes as well as some predictable and unpredictable natural responses. Dunes will be bulldozed; marshes drained or raised by filling; grasses trampled; sea walls built; and, sand sharing systems restricted or severely altered.

Man-made activities on barrier islands, particularly that of creating and protecting building sites, require altering the natural resources. Alteration of the natural condition means disruption of the energy dynamics so unique and critical to maintaining the barrier island itself.

Under this alternative, some of these resource features will be recognized and protected through governmental and private efforts, but only to a limited extent.

Cultural Resources

Some cultural sites will be acquired and protected even with no specific new Federal initiatives for barrier island protection. Recent increases in both the Land and Water Conservation Fund and the National Historic Preservation Fund and changes in tax laws relative to historic properties will provide that opportunity. Others will be given suitable recognition, placed on one of the registers, and given some protection under Section 106 of the National Historic Preservation Act. While the Advisory Council on Historic Preservation and the State Historic Preservation Officers have an important role in implementing regulations for Section 106, the initiative for protecting cultural sites still will rest with local jurisdictions and private organizations and individuals, with few if any new incentives.

Since there is no complete inventory of historical sites on the barrier islands nor an assessment and evaluation of their individual importance, there is no practical way to gauge the number of sites, their value to society, or the potential loss to development that may occur.

With no changes in the rate at which important historic, cultural, and natural sites are being identified, evaluated and provided recognition, losses of these valuable reminders of our heritage will continue to mount. Even an increase of the rate of identification may not help much if protective methods are not given more positive authority to prohibit destruction of the resource.

There is potential for a serious conflict between natural resource conservation and cultural resource preservation on barrier islands. As sea level continues to rise, the islands will continue to recede toward the mainland. This recession will progressively threaten more and more cultural resources, both of document significance and those still undocumented. Lighthouses, military fortifications, whaling stations, and other resources already are threatened and the degree of threat can only increase with time. Protection measures can have serious adverse impacts on natural shoreline processes responsible for perpetuating the barrier island system, but failure to act can result in loss of the historic resources themselves. Relocation is, of course possible, but typically very costly and probably feasible only in the case of the most significant barrier island structures.

Vegetation and Soils

Barrier island soils are extremely loose and erodable. Unwise development will accelerate the rate of erosion and hinder the growth of vegetation that has adapted to that erosion.

Continued development at current rates will increase threats to the important ecological values of barrier islands. Excellent examples of maritime forest already are threatened by proposed development on St. Phillips Island, South Carolina, and on Bogue Banks, North Carolina. The last remaining grove on Padre Island, Texas, is a small stand of five trees near the northern half. Human use and grazing are blamed for the general decline of the natural forest vegetation on Padre Island.

Grasses which are vital to dune development and maintenance and which are adaptable to the severe natural conditions cannot survive heavy OHV use, bulldozing or repeated heavy foot traffic. Unless future development is carefully planned to protect the dunes and dune vegetation, dune grasses will suffer severely and erosion of dunes and shorelines will accelerate.

If the trend of building closer and closer to the shoreline continues, desirable beach areas will be cut off from public access and more structures will be demanded to protect those buildings whose main "selling point" is convenient beach access. More likely, as in the cases of Ocean City and Miami, the beaches will simply disappear.

Water

Fresh water on barrier islands results from precipitation which filters down into aquifers originating on the island itself (freshwater lens), from deep aquifers originating on the mainland, or from pipelines extending from mainland sources. There is no natural watershed; this characteristic of the barrier island is a critical one. The maintenance of high water quality in the fresh water lens depends greatly on striking a balance between supply and demand and on proper wastewater treatment. Without that balance and proper treatment, water from mainland sources is required.

With no further restrictions on Federal grant, loan, or permit programs, commercial and service industries will continue to be attracted to barrier island locations. The economic environment will be enhanced but increasing demands also will be placed on limited fresh water supplies and on the capacity of the islands to absorb wastewater discharges.

The low level alternative will not inhibit increased urbanization or greater demands for high quality water. Nor will it satisfy the needs for improved monitoring and enforcement of water quality standards.

At the Federal level, the FWS will continue to be the agency primarily concerned with acquiring new sites on barrier islands. If funds are made available over the next several years, tentative plans of the FWS call for the acquisition of about 44,000 acres and 14 miles of beach on two barrier islands. Long range plans envision the acquisition of about 28,000 additional acres and 26 miles of shoreline on six other barrier islands. The areas acquired will protect and enhance valuable fish and wildlife habitat and provide incidental low density recreation and public education programs.

The National Park Service (NPS) will continue to acquire private lands within authorized unit boundaries. Evaluation and assessment of potential new NPS Atlantic and Gulf Coast barrier island units for inclusion on the list of recommended areas (authorized under the provisions of the NPS Administrative Authorities Act) has identified three barrier island areas for possible further study. One of these is a high priority area and pending the availability of funds, should be studied in the near future.

A low level action alternative will continue the intense competition between development and recreation interests for developable barrier island locations. Land values will escalate to the point where only high density development is economically practical and precludes acquisition of the high quality lands for low density recreation purposes. Unless specific barrier island related acquisition programs are promoted, high quality recreation sites will continue to be lost to residential and commercial development.

The proposed Heritage Program, if authorized, will provide additional incentive for the identification and inventory of valuable natural, cultural, and historic properties on barrier islands. It may also inspire agencies to acquire them and/or strengthen the non-acquisition protective mechanisms now available.

Federal agencies will continue to expand their knowledge of barrier island dynamics and values and make information available to other public and private organizations. Improved management and protection of barrier islands should result.

Land Use

A low level action alternative will allow continued loss of valuable barrier island resources to urbanization. The figures provided by the United States Geological Survey for the period 1950 to 1973-4 show an average increase of 6000 acres per year for urbanized lands on the barrier islands study units. At the same time the figures indicate a loss of wetlands in a similar average amount.

During the period, lands in agriculture diminished by over 4,100 acres, lands in forest cover increased by about 27,300 acres, urban lands increased by 137,850 acres. Some of these trends will be altered by the recently issued Executive Orders and the President's expression of concern for barrier islands protection.

Since most barrier island soils have limited capacity to absorb or filter septic system discharges, increased development utilizing septic systems will pose serious threats to the quality of ground water supplies.

Simply providing more wastewater treatment facilities is not necessarily the answer. Development pressures on those islands where means of access already have been developed, utilities and wastewater treatment are in place, and other elements of the infrastructure are operating, will continue to create a "Catch 22" situation. That is, more people create more demands for more facilities which create more opportunities and inducements for expanding development for accommodating more people who in turn require more facilities.

An unfortunate illustration of this theory is Hilton Head Island, South Carolina, once considered to be a good example of development based on an environmentally compatible carrying capacity. The attitude of the current developers appears to be one of letting market demands rather than the environment determine the capacity. A result is that condominiums are being constructed, a new four lane highway and bridge are being built to accommodate the increasing population, and--the wastewater treatment load is exceeding the capacity of the treatment plant, valuable shellfish beds are being polluted, and the important shellfish industry is threatened. This scenario has potential for being repeated numerous times under a low-level alternative.

Recreation and Public Lands

Recently authorized increases in the Land and Water Conservation Fund (L&WCF) will, if fully appropriated, permit increased acquisition of barrier island sites by public agencies at all levels. However, unless specific barrier island related programs and policies are established, the likelihood of barrier islands being given higher priority than they now are is remote.

Without specific new incentives to help offset the high costs of development and maintenance and the relatively low public recreation benefit, many States and localities will continue to give barrier islands low priority for acquisition under the Land and Water Conservation Fund grants-in-aid program.

The State and local agencies requesting L&WCF assistance establish their own priorities for use of the requested funds. With few exceptions, these priorities more than likely will continue to favor mainland areas, easily accessible to large numbers of people and more suitable for high density recreation development.

Among the States, only Florida has an active program for acquiring barrier islands and other waterfront areas. Although most of the other States and some localities have acquired barrier island sites for recreation purposes, for a variety of reasons, such sites generally have not been of high priority. South Carolina is the only State to request a Land and Water Conservation Fund grant for a component of its SCORP specifically related to barrier islands. This plan component will deal with barrier island carrying capacities.

It can be assumed that the Wetlands Protection Executive Order will restrict most activities which would tend to further diminish the barrier island wetland acreage from its current level of about 840,000 acres.

Furthermore, many of the kinds of areas that have previously been developed with Federal assistance may not qualify in the future because of the Floodplains Management Executive Order. However, by restricting the areas in which Federal assistance may be operable, competition for the remaining areas located above the 100 year floodplain will intensify, driving up the costs and making it more difficult for public agencies to justify acquisition.

Transportation

A low level alternative that permits increasing urbanization and recreation use of barrier islands also will cause demands for expansion and improvement of transportation networks to and on barrier islands. Improvements will be required simply to move goods and services necessary to support the increased populace and serve increased recreation visitation, as well as to provide quick escape in the event of major storm threats.

More pressures will be placed on the U.S. Coast Guard to approve permits for new bridges or improvements to existing ones. Highway carrying capacities will be increased by improvements and widening. New systems such as hydrofoil ferries may be incorporated where bridge or causeway construction is not practical or where heavy recreation demand requires alternative modes of transportation. Conflicts between transportation agencies and conservation oriented agencies and groups will intensifty as the competition for land for various uses increases.

Climate

A low level action alternative would have no effect on the climate or on the frequency or severity of storms.

People

A low level action alternative could have a profound effect on the densities and distribution of barrier island populations. Population densities in specific developable areas will increase as less and less land becomes available for urban expansion. Seasonal populations will continue to be many times greater than resident populations.

With the disproportionate rate of in-migration to coastal counties, more and more pressure will be placed on developing barrier islands as permanent places to live, work, and play. The fact that nearly 80% of all people now living on barrier islands have never experienced a hurricane and that substantial numbers appear to be in older age brackets (65 years and over) suggests that without improved storm warning, evacuation planning, and routes of escape, the consequences of a major hurricane hitting a heavily developed barrier island will be catastrophic.

Residential communities will continue to thrive and expand and, until a natural disaster strikes, increased numbers of people will inhabit barrier island communities. However, much of the development will continue to be at the expense of the general taxpayers who may never have the opportunity to enjoy that environment.

Urbanization between the years 1950 and 1973 was greatest in the States of North Carolina, South Carolina, Florida, and Texas. Florida and Texas have experienced severe hurricane damage in the past and have the highest likelihood of hurricanes occurring in any given year. Increasing densities along these coastlines creates the potential for storm damage of catastrophic proportions. It is estimated that because of the tremendous increase in development along the Florida Atlantic Ocean coast, one major storm in that area could cause as much damage as the cumulative total of all storms occurring in the first 60+ years of this century.

Pumping for petroleum products and water along the Texas Gulf Coast has caused localized land subsidence (5-7 feet in some places) making low lying lands, and occupants thereof, extremely vulnerable to inundation from tides and storms around Galveston Bay. Areas that were above Hurricane Carla storm surges in 1961 now would be subjected to surges.

In the Northeast, New Jersey, New York, and Massachusetts have experienced the greatest urbanization of barrier islands. These coasts suffered severe battering from northeasters in the early months of 1978.

Current policies are permitting the restoration or rebuilding of several of the heavily damaged areas. The replacement cost of structures is rapidly escalating and will be reflected in future damage estimates.

The increasing scarcity and high cost of fuel may change peoples' patterns of using barrier islands, especially those who make frequent, short trips. Those who may be full time seasonal residents probably will not be so severely affected. However, even for them, fuel shortages may be calamitous during the threat of a hurricane.

Major Wildlife

A low level action alternative could have severe adverse impacts on wildlife habitat and populations; food sources could be lost and entire species threatened.

However, the Fish and Wildlife Service has an active program for acquiring, protecting and/or enhancing wildlife habitat and that would not change dramatically under this alternative. As previously described, the Service has programmed acquisition of several areas on barrier islands. Costs for acquiring lands on barrier islands which may not otherwise be protected by the two executive orders cited earlier or by other means, will rapidly become prohibitive prompting the FWS to acquire lands of less cost on the mainland or to seek greater use of less than fee acquisition methods on barrier islands.

Development will continue to have impacts more far reaching than on the specific site being developed.

Expanding urbanization may cause overdraft or pollution of the fresh water lens and affect vegetation serving as food or cover for wildlife and adversely affect important nursery beds and shell fishing areas around the islands. Noise from construction at certain critical periods may interrupt breeding or nesting activities. Unwise development may alter wind patterns and affect dune dynamics on which barrier islands are so dependent.

Without a specific barrier island related Federal protection program, greater reliance will need to be placed on States, localities, and private interests for protection of valuable habitat areas.

Moderate Level (Redirection of Authorized Programs) Alternative

This section describes, in general terms, the extent of the consequences which could result if the moderate options to protect barrier islands were adopted.

These options highlight and place emphasis on redirecting and maximizing existing authorities for protection of the natural processes of barrier islands. Under this alternative a number of changes would take place in various Federal program areas to make the public more aware of the need for protecting the islands, for recognizing their dynamics and resource character, and for moving toward a national policy to protect barrier islands. In addition, more emphasis would be placed on a stricter application of the NEPA requirements.

Planned uses of barrier island lands would be more cognizant of soil and vegetation capabilities for supporting people and developments; more protection would be afforded wetlands and dunes, although some erosion would continue to occur naturally. Furthermore, as a result of stressing protective measures, greater assurance would be realized in maintaining the quality of ground water supplies. More thorough and precise determination of the available water resources, in relation to projected growth estimates, would aid immeasurably in achieving a balance between water supply and demand.

Environmental consequences would be most pronounced on mainland areas where visitor parking and embarkation centers would be located as well as where highway construction and increased transportation facilities would be needed. However, transportation networks on the islands would be minimized; such networks would provide for recreational access and would supplement escape routes.

More attention would be given to the cultural and historical resources of the islands, which reflect the National heritage, as well as those sites having the potential for supporting these resources. More effort would be placed on the expeditious identification of sites and facilities worthy of protection.

Recreational opportunities for the general public would be expanded; increased recreation development could create substantial economic activity in surrounding areas for development of support facilities and services.

Public land holdings would probably increase. Habitat areas for wildlife and a diversified fishery would be given more safeguards from human encroachment. Interference with the natural processes of shoreline erosion and dune dynamics would decrease as developmental activities became increasingly restricted. Major wildlife and plant communities would benefit greatly. Recognition would be given to habitat values and the fragile nature of the barrier island ecosystem.

In many locations, population density would be dispersed or reduced while in other areas the density would probably increase as land for development becomes less available. The general profile of the people inhabiting barrier islands probably would not change substantially from what it is now. Seasonal populations would continue to be many times greater than resident populations. Although it is difficult to quantify in socio-economic terms the benefits of protecting natural and cultural resources on the barrier islands, it is apparent that these benefits do exist. Some loss of developmental potential or economic gain may result on the barrier islands themselves. However, much of the development likely would be transferred to mainland sites; hence, not all of the development investments would be lost.

Protection of the barrier island resources not only is compatible with local economics, but may also enhance them. Some development will continue to take place, tourists still will be drawn to barrier islands, and dollars will be invested. Additional spinoffs could result in better employment rates, improved community services, and, hopefully, a keener awareness of barrier island natural values. Above all, the health, safety, and well being of many island users would be safeguarded.

Also, taking the Federal Government out of the barrier island subsidy business would mean less government spending and would put barrier island development back into the "free enterprise" system. Development is not stopped, but it is made to pay its own way. Likewise, projects not built in areas subject to inevitable catastrophic hurricanes will, in the long run, save millions of dollars in disaster relief, reconstruction costs, and erosion prevention. More importantly, the risk to life and property would be further lessened.

High Level (Legislation and Executive Directives) Alternative

This alternative expands upon options discussed under the moderate level alternatives. It affords greater protective measures and heightens awareness of barrier islands and the need to protect their natural values and environmental qualities. The options reflect a strong position toward positive environmental consequences. Actions resulting from the options would pointedly favor the natural conditions and reduce economic development on barrier islands.

Fish and wildlife, wetlands, recreation areas, water quality, vegetation, historical sites, soils, and other related elements, would be assured of a high degree of protection. The options would promote a high quality standard for land utilization and husbandry.

As selected options are implemented over a time span of several years, Federal expenditures to protect developments would be significantly reduced; the risks to life and property would be minimized; fewer transportation connectors would be constructed; and population densities on barrier islands would be reduced. Hazardous areas would reflect actuarial insurance rates; and disaster reconstruction would be carefully planned and directed in a manner to prevent further economic losses. Through some options, acquisition proposals would be addressed to further safeguard the barrier islands and minimize land speculation maneuvers.

Economically, these options could have severe short-term adverse impacts in localized areas. Substantial amounts of land would be removed from local tax rolls, future development possibilities curtailed, and economic growth restricted on many of the islands. Some transfer of economic investment from barrier islands to mainland sites would take place and the potential growth of mainland areas should be greatly enhanced by tourist and other recreation related support industries.

The end result of these options would be a national policy to perpetuate a valuable and fragile natural resource--one which reflects this Nation's heritage and defends this Nation's mainland from the everpresent threat of coastal storm.

Relationship Between Local Short-term Use of the Environment and Maintenance and Enhancement of Long-term Productivity.

Low-level Alternative

The low level alternative permits continuation of existing Federal grant, loan, permit and other programs which encourage barrier island development and occupation. Impediments to those programs will come only from increased activity by the conservation minded community of interests.

The low level alternative will not materially alter man's short term use of the barrier islands. However, long term maintenance and enhancement of the natural environment will be jeopardized. Productivity of the islands and their adjacent bays will, over time, be restricted by increased manipulation and disruption of the natural system.

Lost will be lands and natural features that contribute to the inherent productivity of the barrier islands and their associated bays and marshlands. Increased development also will cause increased depletion and pollution of ground water supplies. Short term economic growth will occur locally as service industries and facilities develop to supply and maintain larger numbers of people residing on the islands. However, as the expanding development encroaches more and more on the high hazard areas and disrupts the natural storm protective features, the potential for long-term economic losses in terms of damage to personal property and loss of life from catastrophic storms will be extremely high.

Moderate Level Alternative

This alternative will not materially alter man's short term use of the barrier islands but has potential for improving the long term maintenance and enhancement of the natural environment.

The options which are adopted will require greater attention to be given to the natural values and to mitigating the impacts on those values from all development proposals.

The options will dampen Federal development oriented programs. At the same time, increased funding of authorized programs for resource protection and enhancement will make those programs more competitive with the development programs. As a consequence, important natural areas and values will be protected from short term economic development and long term productivity will be enhanced. Improved public access to an existing public resource will be provided.

Unwise development projects still will be proposed. However, permits and subsidies should be reduced significantly. Increased numbers of people still will place their lives and personal property in jeopardy. Damage from major storms will be immense. Economic losses to individuals and communities from hurricanes and northeasters will continue to be shared by the general taxpayer.

High Level Alternative

Protection of barrier islands in the manner and by the actions which are adopted in this alternative will not materially affect man's short-term use of the environment. Long term productivity of the islands and their adjacent bays and estuaries will be significantly enhanced.

The options permit continued use of the barrier island resource but, over time, will alter the manner in which that resource is used. Some development will continue to take place. However, it will be accomplished with little if any Federal assistance and with some restriction on where and how it is built. What is developed will be done within the "free enterprise" system; for the most part, made to pay its own way.

Restricting Federal assistance in new development or redevelopment of storm damaged areas will limit expansion into new areas but may cause increased densities in currently developed areas.

Short-term economic losses will occur locally but some offsetting investments and economic growth will occur on proximal mainland areas.

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APPENDIX A

FEDERAL PROGRAMS

Appendix A—Federal Programs

Introduction

Federal programs have, in many ways, encouraged and allowed development of barrier islands, resulting in potential problems of public health and safety, increasing costs, and loss of important public benefits provided by unspoiled barrier islands.

This situation is not the result of any directed Federal policy to encourage barrier island development. Rather, it results from a general lack of knowledge and understanding of barrier islands as unique resources warranting special attention. While a broad range of Federal and State authorities address aspects of barrier island land management, barrier islands as a whole are treated only as a peripheral concern. As a consequence, the land management needs of barrier islands are not effectively being met. A discussion of Federal responsible agencies and their programs, which could have significant implications upon barrier island environments follows.

Agencies are listed in the following order:

- o Heritage Conservation and Recreation Service (HCRS)
- o National Park Service (NPS)
- o Fish and Wildlife Service (FWS)
- o Bureau of Land Management (BLM)
- o Environmental Protection Agency (EPA)
- o Department of Commerce (DOC)
  - —Office of Coastal Zone Management (OCZM)
  - —Economic Development Administration (EDA)
- o Corps of Engineers (COE)
- o Federal Emergency Management Agency (FEMA)
  - —Federal Disaster Assistance Administration (FDAA)
  - —Federal Insurance Administration (FIA)
- o Council on Environmental Quality (CEQ)
  - —Executive Order (EO) 11988
  - —Executive Order (EO) 11990
- o Department of Transportation (DOT)
  - —United States Coast Guard (USCG)
  - --Federal Highway Administration (FHWA)
- o Housing and Urban Development (HUD)
- o Farmers Home Administration (FmHA)
- o Small Business Administration (SBA)
- o General Services Administration (GSA)
- o Department of Energy (DOE)

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Heritage Conservation and Recreation Service (HCRS)

The HCRS derives its authorities for program implementation affecting barrier islands from its "organic act" P.L. 88-29, enacted by the Congress on May 28, 1963; the Land and Water Conservation Fund Act, P.L. 88-578 as amended; and functions transferred to it under a Memorandum of Understanding between the HCRS and NPS dated January 31, 1978. These latter include functions authorized by:

- The Historic Sites Act of August 21, 1935;
  16 U.S.C. 463
- The National Historic Preservation Act of 1966;
  16 U.S.C. 470
- The Archeological and Historic Preservation Act; amendments of 1974; 16 U.S.C. 469

Although the HCRS does not directly manage or administer lands, its program authorities have significant potential for shaping or influencing use of barrier islands. For example, of the 5750 projects approved for LWCF assistance in the 18 States, 112 are for barrier island projects. About 50 of these were for acquisition projects but that number would be substantially less except for the emphasis Florida has placed on acquisition of coastal areas. That State has nearly five times as many acquisition projects than development projects. Although there are more development projects, the dollar figure for acquisition is nearly three times that for development. The total LWCF apportionments to the 18 States has amounted to $681.5 million. Of this $51.4 million has been allocated to barrier islands projects.

To qualify for grants under the Land and Water Conservation Fund, States must have in existence a Statewide Comprehensive Outdoor Recreation Plan (SCORP), up to date and approved by the Secretary.

Such plans have been prepared by all 18 States and have been approved. However, because these plans are focused at the level of State policy and implementation of State programs, they do not provide a framework for managing particular areas or kinds of resources, such as barrier islands.

Furthermore, the present HCRS guidelines for preparation of the SCORP contain no special provisions to promote protection and environmentally compatible uses of barrier island resources in general or of protected islands in particular. As a result, the plans are unlikely to recognize the unique resource characteristics and hazards associated with barrier islands and to sensitively take them into account in developing State policies and programs for acquisition, management, development, and public use of barrier island areas.

At the project level, State as well as local planning is focused on the design of particular facilities to support administration and public use of a specific area or on the development of specific management programs and projects to enhance wildlife, fishery, or other values. Such planning may facilitate expeditious implementation of projects, but is of limited value as a vehicle for integrating various management activities within the protected area or for integrating the protected area into its surrounding regio .

Proposed changes in SCORP manual provisions may provide a framework within which States could address barrier island programs and projects. The proposed provisions suggest that States consider areas of national concern. However, barrier islands are not mentioned as a typical resource of national concern and the provisions are not mandatory.

HCRS also evaluates and designates significant natural, historic, and cultural areas on all barrier islands which qualify for inclusion on the National Registry of Natural Landmarks and the National Register of Historic Places.

Although listing of a resource on one of the Registries does not ensure that the resource will be protected totally, such action does highlight the significance of the resource.

Official designation by the Secretary of the Interior is required before a site can be listed on one of the National Landmarks Registries whereas properties on the National Register of Historic Places are designated by the Keeper of the National Register, an HCRS official.

Although there have been very few instances to date where a listed resource has been compromised or destroyed, the future of resources not permanently protected through public ownership or other means is unpredictable. The prognosis is further clouded by the fact that privately owned resources may be designated as Natural Landmarks or National Register Properties without the owner's consent, although every effort is made to secure the owner's cooperation in protecting significant resources. In the case of Natural Landmarks, a gentlemen's agreement between the owner and the Secretary of the Interior, indicating the owner's intention to protect the significant resources, must be signed before a designated Natural Landmark can be registered officially and the site marked with an identifying plaque. To date, only 17 registered Natural Landmarks have been established on barrier islands. In the case of National Register properties and National Historic Landmarks, significant resources have received a substantial measure of protection from the adverse effects of Federal or federally assisted activities since 1966, when the National Historic Preservation Act was signed into law. Section 106 of the act, and its implementing Executive Order 11593, establish requirements for identifying significant cultural resources and for mitigating the adverse effects of Federal actions upon them through cooperative agreement with an independent historic preservation agency in the Executive Office of the President. Although these requirements have effectively promoted resource preservation by the Federal Government, they cannot be invoked to curtail actions by the private sector or non-Federal government agencies when Federal funding or other assistance is not involved.

The Historic Preservation Fund, administered under the authority of the National Historic Preservation Act of 1966, makes matching grants for historic preservation to the States from an annual appropriation for that purpose. The States may use the grants for surveying, evaluating, acquiring, and preserving significant cultural resources.

Since the program was first funded in 1970, through FY 1978, over $46,625,000 have been granted to the 18 barrier island States. Considerably less than 1% of this amount is estimated to have been used to promote resource preservation on barrier islands.

Although appropriations have increased over the past several years (actually, the Congress has appropriated more money than has been requested) there apparently has not been any great significance placed on identifying and protecting barrier island cultural resources.

The HCRS may be able to give higher priority to these resources under its proposed National Heritage Policy Act of 1979. The proposed Heritage Program is a Federal initiative to coordinate and strengthen existing public and private efforts to identify and protect significant natural areas and historic places. It will provide a basis for developing and defining a consistent, consolidated policy and program for heritage resources. A national program for historic preservation has been in place since the 1966 Historic Preservation Act and the natural heritage component of the National Heritage Program should be brought up to a similar level of sophistication and development.

The purpose of the program is to establish a national policy and provide the basis for implementing a program to assist in the identification and protection of areas and places of significance to our heritage. Our national heritage consists of that collection of resources important to Americans because they are significant aspects of our history and culture and significant elements of our natural environment. Natural areas include land and waters of ecologic and geologic significance to this Nation's natural environment at the national, State, and local level. Historic places include districts, sites, buildings, structures, objects, networks, cultural landscapes, and neighborhoods significant in American history, architecture, archeology or culture at national, State and local levels. By identifying these areas and places, we will be helping to preserve our American heritage.

HCRS also maintains a barrier island data inventory and data bank and provides for technical assistance as provided by its Organic Act. The data bank consists of about 50 bits of information on each of the nearly 300 units identified in the study. These data bits include information on physical attributes as well as development status, ownership, management, and other characteristics. Such information is vital to the discernment of changing trends and to the development of long range management plans and objectives.

National Park Service (NPS)

The NPS authorities for barrier island activities stem mainly from the Act of August 25, 1916; P.L. 64-235; 16 U.S.C. Section 1 et. seq. This act established the basis for the current system of national parks, monuments, and recreation areas and for the service which administers them. NPS activities on barrier islands also may be affected by the:

- Park, Parkway, and Recreation Study Act of June 23, 1936; P.L. 74-770; 16 U.S.C. 17;
- NPS Administrative Authorities Act; P.L. 94-458; 16 U.S.C. 1a-1; and
- The Wilderness Act; 16 U.S.C. 1131-1136.

The national seashores and recreation areas which are situated on barrier islands were created individually through separate acts of Congress. Among other things, each act specifies the purposes for which the unit was established, identifies the general boundaries, sets out basic management guidelines, and establishes the authorities governing the Secretary's right to acquire land by various means. These authorities vary widely and extend from the exercise of powers of eminent domain to acquisition by donation or purchase from willing sellers.

For the purposes of "developing coordinated and adequate public park, parkway and recreational-area facilities for the people of the United States," the Park, Parkway, and Recreation Area Study Act of June 23, 1936; P.L. 74-770; 16 U.S.C. 17 authorizes the

Secretary of the Interior, operating through the NPS "to aid the several States and political subdivisions thereof in planning such areas therein, and in cooperating with one another to accomplish these ends." Assistance provided under the Act may include technical and advisory services on organization, O & M,* historical and archeological programs (transferred to HCRS 1-31-77), and general development planning. Limited technical assistance may be provided without charge to local and State agencies if staff are available. Major planning efforts would be conducted on a reimbursable basis.

Several NPS administered barrier island units are adjacent to lands where existing or proposed uses are adverse to the purposes of the Federal areas. The future use of these adjacent lands may pose the greatest potential threat to the integrity of the Federal unit when the lands consist of private communities located on the same island as the Federal unit. This occurs at Cape Hatteras where the national seashore is punctuated by no less than seven community developments. The threat is somewhat less if the communities are separated from the Federal unit by an inlet that serves as an access barrier, such as occurs between Ocean City, Maryland, and Assateague Island National Seashore. Development of adjacent lands is governed by State laws and local ordinances. In most locations, particularly in undeveloped rural areas, local development controls are typically inadequate to ensure the compatibility of development with barrier island resources in general and the protection of the Federal unit in particular. If developed intensively for residential and commercial uses, adjacent lands can seriously impair the quality of the natural environment--through groundwater pollution, surface water pollution, impairment of wildlife habitat values, and related ecological effects--as well as the quality of the visitor's experience--through traffic congestion, impairment of visual quality, and degradation of the inspirational value of the barrier island. If shoreline stabilization measures are implemented to protect developed areas from erosion, destabilization of the sediment balance of nearby Federal lands is a probable result.

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*operation and maintenance

The extent of private land holdings varies widely by park area from less than one acre to nearly 7500. Development on those lands ranges from dispersed residences to whole communities and several thousand structures.

Eight National Park Service areas contain substantial acreages of non-Federal public lands which can be acquired only by donation or exchange. As of 12/31/76, the total acreage involved was about 120,600. Most of these are submerged lands that are administered by the States and are likely to be transferred in the future. Five areas contain State parks and one contains municipal and county parks on the barrier island itself. These parks are likely to be transferred in cases where Federal administration would not result in a reduction in the level of public recreational use. However, where there is a reasonable likelihood that Federal administration would result in a reduction in this use, the administering agencies generally are unwilling to transfer parklands to the Federal government. Unfortunately, the juxtaposition of intensively used and substantially developed non-Federal lands and undeveloped Federal lands with low-intensity use has created management problems which are likely to increase along with increasing public use of the non-Federal parks.

Public Law 94-458, the NPS Administrative Authorities Act, directs the Secretary of the Interior "to investigate, study, and continually monitor the welfare of areas whose resources exhibit qualities of national significance and which may have potential for inclusion in the National Park System, and annually to submit a listing of not less than 12 such areas to the Speaker of the House and President of the Senate."

Threats to resource values and cost escalation factors are to be consid in determining the relative importance or merit of the areas.

In fiscal year 1978, a list of 17 areas was submitted—none of the areas was on an Atlantic or Gulf Coast barrier island. The listing for fiscal year 1979 contains 19 areas and only one, Cape Fear, involves a barrier island. Subsequent listings suggest barrier islands are faring better. Of the 14 highest priority areas to be studied in the immediate future (pending availability of funds) one is a unit containing about ten islands. Of the 16 second priority areas, two are barrier islan Perhaps in no other type of area are "threats to resource values and cost escalation factors" such important considerations as they are on barrier islands.

Wilderness designation and the designation of qualified areas as Research Natural Areas and National Environmental Study Areas are additional means to protect barrier islands.

Wilderness designation offers perhaps the greatest possible level of protection that could be given to a barrier island under NPS administration. Thus far, 1,800 acres have been designated and another 2,800 acres have been identified as potential wilderness in Gulf Islands National Seasore. At Everglades, 1,296,500 acres have been designated as wilderness and 81,900 acres have been identfied as potential wilderness. NPS has one other area proposed jointly with the Fish and Wildlife Service. This is at Assateague and the NPS portion is 440 acres.

Research Natural Areas are lands and waters set aside to protect a "representative array of all significant natural ecosystems" as baseline areas for the purpose of obtaining information that is useful in understanding these ecosystems and in comparing them with manipulated ecosystems. RNAs have significant value in long-term environmental monitoring and research, in detecting changes and trends in environmental conditions, and in providing objective information on which to base land management decisions. They are administratively designated by the administering Federal agency and receive protection in accordance with agency policies and regulations. These policies and regulations generally conform to the Standards and Policy Guidelines for Research Natural Areas published by the Federal Committee on Ecological Reserves, chartered in 1974 under the auspices of the Council on Environmental Quality and the National Science Foundation with 19 agency members. The Committee acquires and disseminates informatio on RNAs and published an updated directory in 1977.

RNAs currently receive no special legislative protection and are managed for educational and research purposes solely as a result of a particular agency's administrative commitment to do so.

To date, the only designation of RNAs on barrier islands has been done by the U.S. Fish and Wildlife Service within 6 units of the National Wildlife Refuge System and by the U.S. Air Force at Matagorda Air Force Base in Texas. The National Park Service has not designated any RNAs in barrier island units, although all of the NPS units—except Wright Brothers National Memorial—have areas that potentially qualify.

The National Park Service also is responsible for designating suitable sites as National Environmental Study Areas (NESAs) following a request to do so by a local school system or other educational entity. These designations provide special recognition to areas which, by virtue of their resource values and history of educational use, have acquired particular educational significance. NESAs may be designated wherever a site is of particular significance in carrying out environment education objectives.

A New National Park Service Policy

Until recently, the national seashores were managed under the National Park Service's guidelines for recreation areas, as opposed to natural areas and historic areas. The primary purpose of the seashore was to provide appropriate recreational opportunities, sometimes for large numbers of visitors. This promoted construction of roads, utilities, took measures to protect its investment other facilities. Not surprisingly, the NPS, like other owners of barrier island property, felt obliged to protect its investment against the islands' natural proclivity to move around.

The NPS has adopted a "Management Policy for Shoreline Processes" which states that, as far as possible, and cognizant of NPS responsibilities that accrue from its previous policy and actions, there will be no further attempts to restrain the natural processes of erosion, deposition, dune formation, and inlet formation. The policy further states that:

> "In development zones, management should plan to phase out, systematically relocate, or provide alternative developments to facilities located in hazardous areas. New facilities will not be placed in areas subject to flood or wave erosion hazard unless it can be demonstrated that they are essential to meet the park's purpose, that no alternative locations are available, and that the facilities will be reasonably assured of surviving during their planned lifespan without the need of shoreline control measures."

This new policy for barrier island land management will be implemented on a seashore-by-seashore basis, and will be accomplished through each unit's general management plan. The specific application of the policy can be seen in the example of Fire Island National Seashore, where the following actions demonstrate the application of the policy to a specific management unit:

- The NPS will attempt to restore the island's natural sand movement.
- A sand by-pass will be developed to reestabish and maintain the natural littoral drift and prevent the sand entrapment that now robs the beach of its supply of sand.
- No inlets will be opened artifically. Naturally-opening inlets will be evaluated on ecological, economic, navigation, and access factors and either retained or closed.
- There will be no beach stabilization structures. Sand fences will be used only where vegetation is sparse and dune buildup is necessary.
- All pedestrian dune crossings will be on elevated boardwalks, and all vehicler dune crossing will be limited to those essential for access and management.
- There will be no anti-mosquito ditching in the marshes.
- Sand nourishment of beaches on the seashore will be conditioned on implementation by the Corps of Engineers of sand by-pass systems at the inlets.

Each of these policies is subject to a case-by-case analysis of the situation, with possible modification due to extenuating circumstances or long-established patterns or rights. The policy recognizes the existing reality of adjacent property owners' expectation of protection, of the need to maintain services and transportation on routes in neighboring communities, and the need to protect historic zones and some previously-constructed NPS structures. It recognizes that a complete break with past, now discredited policies will not always be possible. But it also makes clear a new direction for seashore planning and management that takes into consideration the dynamics of barrier island geology and ecology.

Fish and Wildlife Service (FWS)

The FWS draws its authorities for barrier island related activities from a number of Acts of Congress. These include, in addition to the Fish and Wildlife Act of 1956, as amended, the following:

- Fish and Wildlife Coordination Act
  16 U.S.C. 661-667e
- National Wildlife Refuge System Act
  16 U.S.C. 668 dd-668jj
- Migratory Bird Conservation Act
  16 U.S.C. 701-718h
- Endangered Species Act of 1973
  16 U.S.C. 1531-1543
- Wilderness Act
  16 U.S.C. 1131-1136
- Recreation Act of 1962
  16 U.S.C. 460k-460k-4

and various acts establishing specific wildlife refuges within the System.

Thirty-one National Wildlife Refuges (NWR) have been established along the East and Gulf coasts, preserving valuable breeding, nesting, and migratory areas for many species of fish, shellfish, and wildlife. An important purpose of the refuges is the fulfillment of U.S. responsibilities for migratory birds, as established in treaties with Great Britain (on behalf of Canada) and Mexico and implemented in the Migratory Bird Treaty of 1918, as amended. The refuges often occupy barrier island fast land, but also include large areas of the marshes and bays, those exceedingly productive ecosystems that provide key habitats for fish and wildlife. The refuges shelter or provide habitat for a large number of species including several that are listed as endangered, such as the bald eagle, brown pelican, whooping crane, and peregrine falcon.

In accordance with the provisions of the Wilderness Act of 1964, the Fish and Wildlife Service barrier island units are being studied for possible inclusion in the wilderness system.

Twelve wilderness areas on wildlife refuges have been congressionally mandated, ranging in size from an 8-acre wilderness area at the Pelican Island NWR on Vero Beach, Florida, to one of 29,000 acres at the Cape Romain NWR on Cape Island, Raccoon Key, and Bull Island, South Carolina. Five other refuges have been studied and found to be qualified and departmental recommendations are awaiting congressional action.

National wildlife refuges are managed in order to protect the feeding, hatching, rearing, and permanent habitats of a wide variety of animal species.

The FWS inventories and lists rare and endangered species of both plants and animals that exist on barrier islands and delineates the areas of critical habitat for those species. Although many of the animals have been listed, many of the plants have not. The designation of critical habitat gives the Endangered Species Act its most definitive thrust.

Management practices aim at improving, and sometimes creating, those habitats. Because development would be inimical to the tranquil, unpolluted, and natural environment required by the animals, the refuges are kept largely natural.

Human visitors are of secondary, but increasing importance on the refuges. The seasonal gatherings of immense numbers of migratory birds or the chance to see an endangered species are of great interest to the public, and more and more visitors are coming to see them. The refuges were created for animals, however, and until the early 1960's were for the most part closed to human visitors. The Refuge Recreation Act of 1962 (P.L. 87-714) changed that policy, establishing the principle that opening the refuges to the public and permitting recreational activities would be desirable as long as the activities were compatible with the primary purpose for which the refuges were established--the protection of animals and their habitats. Within this legal and managerial designation as an "appropriate incidental or secondary use," a number of the barrier island refuges have been opened to the public. The main recreational activities encouraged are those that are wildlife-oriented, such as fishing, use of nature trails, bird watching, and natural history interpretation. All of these activities are consistent with the "incidental and secondary" principle, and are strictly controlled in terms of the number of people engaged in these activities as well as where and when it occurs, in order not to disturb animals during such critical times as nesting, and to protect fragile or susceptible habitats from adverse impact.

The FWS has an active acquisition program and in the past 10 years has acquired all or a major portion of 13 barrier islands involving nearly 60 miles of beach. During the next two years (FYs '79 and '80), the Service expects to begin acquiring at least three more barrier islands involving nearly 40 miles of beach.

Through a land acquisition concept planning process, the Service has identified 44 additional barrier islands in 14 States which appear to be suitable for inclusion in the National Wildlife Refuge System if they cannot be protected by other means.

Bureau of Land Management (BLM)

The BLM has been in existence in one form or another for nearly 170 years. The General Land Office, formed in 1812, was one of the first Federal agencies formed. In 1946 the Office was joined with the Grazing Service to form the Bureau of Land Management.

The Federal Land Policy and Management Act of 1976; P.L. 94-579; 90 Stat. 2743 is referred to as the BLM Organic Act and it is from this Act, plus its responsibilities under the Outer Continental Shelf Lands Act, that BLM derives its authorities for programs which affect barrier islands.

Section 211 of the "Organic Act" authorizes the Secretary of the Interior to convey, under the provisions of the Recreation and Public Purposes Act, 43 U.S.C. 869 et seq., to States and their political subdivisions any unsurveyed islands determined to be public lands of the United States.

The Act also amends the Recreation and Public Purposes Act to require the Secretary to determine that any lands conveyed are not of national significance and that, for parcels of over 640 acres in size, comprehensive land use plans and zoning regulations applicable to the area in which the conveyed lands are located have been adopted by the appropriate State or local authority.

BLM also identifies areas on the Outer Continental Shelf for energy exploration and development and administers the leases

for such areas. Sections 18, 19, 20 and 23 of the Outer Continental Shelf Lands Act Amendment of 1978 appear to provide adequate precautions for protection of the environment and suitable recourse for citizen action in the event of violations of the regulations of the Act. However, there is no specific mention of barrier islands.

Environmental Protection Agency (EPA)

In addition to its recently assigned responsibilities for monitoring environmental impact statements, EPA programs which may affect barrier island development primarily are the result of two major legislative Acts:

1. The Clean Water Act (Clean Water Act of 1977 and the Federal Water Pollution Control Act Amendments of 1972; P.L. 92-500; 33 U.S.C. 1281 et seq.) which authorizes:
   a. Wastewater Treatment Construction Grants: Supports the planning and construction of wastewater treatment facilities. (Sec. 201)
   b. Water Quality Management Planning: Grants to State and designated areawide planning agencies for the development and implementation of areawide water quality management programs. (Sec. 208)
   c. National Pollutant Discharge Elimination System (NPDES): NPDES permits issued to individual dischargers (including municipal waste treatment plants) setting limitations on amount of pollutants a discharge may contain. (Sec. 402)
   d. Permits for Dredged or Fill Material (Sec. 404).
2. Clean Air Act of 1963, P.L. 88-206, 42 U.S.C. 1857; as amended by P.L. 91-604, the Clean Air Act Amendments of 1970.
   a. State Implementation Plans (SIP): Submitted by each State for EPA approval, SIP's set emission levels and control

strategies necessary to achieve and maintain national ambient air pollution standards set by EPA.

b. Air Quality Maintenance Areas (AQMA): Usually an urbanized area or SMSA identified in SIP's or designated by the EPA Administrator which, because of current air quality and/or projected growth, have potential for violating any national air quality standard within 10 years. Addition of major new sources or modification of existing emission sources is controlled to prevent further air quality deterioration.

c. Air Pollution Program Grants: Federal funds are available for up to two-thirds the cost of planning, developing, establishing or improving State air pollution prevention and control programs; and up to one half the cost of maintaining such programs.

d. Section 309 Review: This section of the Clean Air Act requires the EPA Administrator to "review and comment...on the environmental impact of any matter relating to...the authority of the Administrator contained in (1) any legislation proposed by any Federal department or agency; (2) newly authorized Federal projects for construction and any major Federal agency action other than a project for construction to which section 102 (2)(c) of (NEPA) applies, and (3) proposed regulations published by any department or agency..." The Administrator's comments must be made public and if he determines that the matter under review "is unsatisfactory from the standpoint of public health or welfare or

> environmental quality, he shall publish his determination and the matter shall be referred to the Council on Environm Quality."
>
> This requirement brings within EPA purview any major Federal action proposal that impacts health, welfare, or the environment on the barrier islands. This includes actions in the territorial sea, the contiguous zone, or the oceans that would impact these islands.

EPA policy and regulations require that activities, such as those listed above, be in conformance with related statutory requirements.

The Coastal Zone Management Act (CZMA)—which could provide special considerations for the barrier islands requires:

1. that the requirements of the Federal Water Pollution Control Act and the Clean Air Act be incorporated into CZM programs developed by the States, and

2. that all Federal activities in the coastal zone (including issuance of permits and licenses) be consistent with State CZM programs.

EPA has issued general guidance to its coastal regions concerning coordination with State CZM programs and specific guidance concerning the interface of its water quality programs with the State CZM programs.

Most EPA actions involve case-by-case evaluations and decisionmaking. This means that where a barrier island is involved, its specific needs should be considered in making any determination.

Perhaps the greatest impact of EPA programs on barrier islands derives from the grants for the planning and construction of wastewater treatment facilities.

Under this program, EPA funds 75% (and in some cases 85%) of the capital costs (excluding land acquisition) of publicly owned wastewater treatment works. The remaining share of the costs are assumed by the State and/or the grant applicant. Many States make grants to aid local governments in meeting the local share.

EPA regulations do not specifically note barrier islands as being geographic areas of special environmental concern. Although an environmental assessment is made of each proposed project, plans and justification frequently are prepared under contract by engineering firms which may or may not be aware of or sensitive to specific barrier island conditions.

The EPA Regional Administrator has the authority to make a negative declaration on a project proposal. The decision is published in newspapers and distributed to areawide clearinghouses and other interested parties. If there is no adverse comment within 15 days, no environmental impact statement (EIS) is prepared.

If an EIS is required, the preparation generally is by an environmental planning firm under a contract. Few EIS reports are prepared by EPA office staff. EPA staff do carefully consider a project's potential impacts on wetlands and in floodplains and require justification for "unreasonable" 20 year estimated population growth figures which may be attributable to a project. However, again there is no special significance attached to a wastewater treatment facility proposal on, or serving, a barrier island community.

EPA regulations for the areawide planning grants do not specifically addres barrier islands. As a consequence, regional plans for water quality management may not be detailed enough to permit analysis of planned or potential impacts on individual barrier islands.

Water quality management plans could have particular significance for barrier islands because the plans must include waste treatment needs for the next 20 years and consider alternatives and land treatment needs. The plans are to include regulatory programs to control all sources of water pollution identified by the State or designated local agency. For example, any construction in fragile ecological areas might be required to get a building permit with an erosion and sedimentation control plan and special monitoring by State officials as conditions to that permit.

Used in the proper place for the proper purpose, EPA grants have potential for significantly improving environmental conditions. However, such grants also can be the catalyst for expanding development beyond the physical capabilities of a barrier island to accomodate it and exposing large numbers of people to extremely hazardous conditions.

DEPARTMENT OF COMMERCE

Office of Coastal Zone Management (NOAA)

The Coastal Zone Management Act of 1972, 16 U.S.C. 1451, (as amended in 1976) encourages

> the participation of the public, of Federal, State and local governments and of regional agencies in the development of coastal zone management programs to achieve wise use of land and water resources of the coastal zone.

The act provides for a voluntary program; there are no sanctions imposed upon any State or territory which chooses to participate.

The act emphasizes the lead roles of State and local governments. Direct State administration, local administration subject to State review are the three optional means of program implementation specifically mentioned in the act. The Federal role is basically limited to providing the States with financial and technical assistance during development and implementation of management programs. The act does provide guidance on the basic framework for State programs and requires participating States to address the following nine points:

1. Identification of boundaries of the coastal zone (determined by State discretion with minimum limits specified in the act);

2. Designation and inventory of areas of particular concern (these may be areas of economic as well as environmental importance);

3. Broad guidelines on priority of uses in particular coastal areas including specifically those uses of lowest priority;

4. A determination of permissible land and water uses which have a direct and significant impact on coastal waters;

5. The means by which the State proposes to control those use (this refers to the implementation authorities the State will use in making its program work);

6. The organizational structure which would implement the management program;

7. A planning process for shoreline erosion;

8. A planning process to deal with the issue of access to public waterfronts; and,

9. A planning process for the siting of energy facilities.

Federal financial assistance for program planning is provided under section 305 of the act for a maximum of five years. Funding for this section expires in September, 1979. Once a State program has been developed and approved by the governor, the State may voluntarily seek Federal approval by the Secretary of Commerce. If the Secretary judges that the management program meets the basic goals of the act, then the State may receive financial assistance under section 306 to implement this program. Presently, coastal management programs from six States along the Atlantic and Gulf coasts have been approved by the Secretary and are receiving implementation funding. The programs of five additional Atlantic and Gulf States should be approved within the next year.

Under section 315 of the act, financial assistance may be provided to enable States to acquire and maintain estuarine sanctuaries, to preserve islands and to provide for access to public beaches and other public coastal areas of importance.

Finally, section 308 establishes the Coastal Energy Impact Program (CEIP) which consists of the provision for financial assistance to meet the needs of coastal States and local governments in such States resulting from specific activities involving energy development.

A final important aspect of the act is its emphasis on intergovernmental coordination and cooperation, especially with respect to "Federal consistency." Section 307 directs States to coordinate with Federal agencies during program development, and in return directs Federal agencies to conduct their activities within each State in a manner which is consistent to the "maximum extent practicable" with States' approved management program. This "consistency clause," related to federally-assisted actions, direct Federal actions and issuance of Federal licenses, permits, and Federal financial assistance to State and local governments.

Economic Development Administration (EDA)

The Public Works and Economic Development Act of 1965, P.L. 89-136, 42 U.S.C. 3121, authorizes the EDA to provide economic development grants and technical assistance to help distressed areas identify, evaluate and understand their problems and economic potential.

Assistance may be in the form of:

1. Studies to identify area needs or solve industrial or economic problems;
2. Grants-in-aid, amounting to 75% of costs of planning and administering local economic development programs, and
3. Management and operational guidance for private firms.

Grants of up to 50 percent of the development cost provide for such public facilities as water and sewer systems, access roads to industrial parks or areas, harbor facilities, railroad sidings and spurs, public tourism facilities, vocational schools, flood control projects, and site improvements for industrial parks. Severely depressed areas that cannot match Federal funds may receive supplementary grants to bring the Federal contribution up to 80 percent of the project cost.

Loans also are available for public works and development facility projects. Loans may pay the full cost of a project and may run for as long as 40 years, the interest being determined by government borrowing costs. A community unable to raise its share of the eligible project cost may receive a grant for 50% or more of the projected cost and a Federal loan for the remainder of the cost.

Provision of public facilities on a barrier island could accelerate its development for urban use.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers administers various programs which have potential for affecting barrier islands. These programs and the Corps authorities for implementing them include:

Beach Erosion Control	Section 103 of P.L. 87-874, Rivers and Harbors Act of 1962, as amended
Flood Control and Coastal Protection Works (Rehabilitation)	Public Law 84-99, 33 U.S.C. 701n, Flood Control Act of 1941; 77-228, 33 U.S.C. 701b *et seq* as amended by P.L. 87-874
Flood Fighting and Coastal Protection Works (Federally authorized)	Flood Control Act of 1941; P.L. 77-228 as amended by P.L. 84-874
Flood Plain Management	Section 206 of P.L. 86-645, Flood Control Act of 1960 as amended
Navigation	Section 107 of P.L. 86-645, Rivers and Harbor Act of 1960 as amended
Regulatory Functions	Sections 9 and 10, Rivers and Harbors Act of 1899; Clean Water Act of 1977

The beach erosion control program is primarily involved with protection of public shoreline by structures (eg. groins, seawalls, jetties) and beach nourishment. The Corps designs and constructs the projects on the basis of engineering feasibility and economic justification.

The coastal protection works program (rehabilitation) provides assistance for repair and restoration of flood damages and shore protection works damaged by extreme storm conditions. Such assistance includes the restoration of federally authorized coastal protection structures but not their improvement or betterment for flood control.

The second coastal protection works program is directed towards emergency assistance which supplements State and local capabilities in time of storms. This assistance includes all phases of flood fighting and rescue operations.

The flood plain management program is a planning function of the Corps and involves technical assistance and guidance to promote a critical awareness of flood hazards in land and water developments.

The navigation program assures that the needs for general navigation are met in an efficient and effective manner. The Corps usually undertakes the program for a State or a political subdivision within the State.

The regulatory functions program consists of reviewing, analyzing, and authorizing or denying permits for proposed discharges of dredge and/or fill material into the waters of the United States.

Corps programs can exert a long-term impact on barrier island ecosystems and the natural processes essential to their continued existence. The most critical Corps programs from the standpoint of impacting upon barrier islands are the shoreline stabilization programs responsible for beach erosion control, hurricane protection, and inlet stabilization. Since these programs involve manipulation of sand-sharing systems, Corps projects can have significant effects on the natural processes responsible for perpetuating barrier island landforms miles away from the actual project site. Likewise, another program, that of navigational dredging, often disrupts the estuarine environment for maintaining dynamic barrier island environments.

The Corps maintains the Atlantic and Gulf Intracoastal Waterways, small craft navigation channels dredged through the shallow bays that separate the barrier islands from the coastal mainland. The need constantly to remove sediment from the channel creates an enormous amount of dredge "spoil" which must be disposed of in an economical, but environmentally sound manner. The practice has been to dump much of the spoil in tidal marshes along the waterway route, primarily because alternative methods are more expensive and the Corps does not always have the right equipment at the right time so as to minimize expenses. Further, the depth of the waterway channel is maintained in most sections at -12 feet MSL under congressional mandate.

In some instances on troublesome shoal areas, the Corps has, for economic reasons, dredged to an overdepth as advance maintenance to prevent the requirement of returning to the same project two or more times in the same dredge season.

Under Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. §1344, and §10 of the Rivers & Harbors Act of 1899, 33 U.S.C. §§401, *et seq.*, the Corps has jurisdiction over any modification of traditionally navigable waters and over all discharges of dredged and fill material into all waters of the United States, including wetlands. Although there is controversy over the scope of the Corps' jurisdiction above mean high water, in part created by the Corps, the agency has been using its authority to protect coastal wetland ecosystems with consistency. The Corps has the power to encourage sound barrier island development by exercising its wetlands protection policy which states that dredge-and-fill permits in wetlands will not be issued if there exists an alternative means—including uplands development—to provide housing.

The Corps has for 10 years been deciding dredge-and-fill permit cases on environmental public interest grounds. The Rivers and Harbors Act of 1899 has been construed by the courts, together with modern laws such as the Fish and Wildlife Coordination Act, 16 U.S.C. §§661, et seq., and the National Environmental Policy Act (NEPA), 42 U.S.C. §§4321, et seq., to require the Corps to consider and act upon factors other than navigation in deciding permit cases in the public interest.

Finally, the Corps provides assistance to Federal, State, and local agencies by replenishing sand from eroded beaches and keeping navigation inlets stable. Each of these activities can be caused by man-made changes in the island geologic processes and, when corrected, can lead to further changes. For example, beaches sometimes erode because buildings have been built on or in front of the dunes. Replenishing the beach may only induce further unwise development.

Of primary concern regarding the programs described above, has been lack or inadequacy of early coordination between the Corps and those agencies responsible for safeguarding barrier islands. All too often the first notice of a proposed project has been the issuance of a draft environmental statement. Unfortunately, by this time, there is often a substantial commitment to the project and a general reluctance to modify conditions compatible to the long-term maintenance of barrier islands.

Federal Emergency Management Agency (FEMA)

As a result of the President's Reorganization Plan Number 3 of 1978, transmitted to the Congress on June 19, 1978, FEMA has been established as an independent agency in the Executive Branch.

The Federal Disaster Assistance Administration (FDAA) was abolished by Executive Order 12148 effective July 15, 1979, and FEMA has now assumed the FDAA responsibilities. The Federal Insurance Administration (FIA) was transferred to FEMA by Executive Order 12127 on April 1, 1979. However, FIA retains its identity as an agency within FEMA.

FEMA draws its basic authorities from the Disaster Relief Act of 1974, P.L. 93-288, 42 U.S.C. 5121. The program objectives are to provide assistance to States, local government, individuals, and owners of selected non-profit facilities "in expediting the rendering of aid, assistance, and emergency services, and the reconstruction and rehabilitation of devastated areas..." and "to alleviate the suffering and damage which result from such disasters..."

Section 201 of the Act authorizes the establishment of disaster preparedness plans, utilizing all appropriate agencies. It provides for technical assistance and grants to the States in developing comprehensive disaster plans and programs, to include hazard reduction, avoidance, and mitigation. All States have already completed a $250,000 maximum one-time "development" grant. Remaining funds provide 50/50 matching grants up to $25,000 annually for updating and improving their preparedness plans and capabilities.

Section 401 authorizes the repair, reconstruction, restoration or replacement of any facility owned by the United States which is damaged or destroyed by any major disaster if it is determined that such a facility is necessary. In implementing the section, the appropriate Federal agency is responsible for evaluating the natural hazards to which the facility is exposed and is required to take the necessary action to mitigate such hazards. However, it should be noted that this section has not yet been delegated by the President.

Section 406 also has important relevance to barrier island situations. This section requires, as a condition for any loan or grant made under the provisions of the Act, that the State or local government agree that the natural hazards of the area in which the loan or grant is to be used will be evaluated and appropriate action taken to mitigate those hazards.

Under Title V of the Act, Recovery Planning Councils may be authorized and established following a major disaster. These Councils are responsible for determining when and under what conditions recovery investment plans should be prepared. The responsibility for this section was delegated by the President (in Executive Order 12148) to the Director of FEMA. However, it has not been funded or implemented.

Council membership consists of, among others, locally elected officials and private citizens. Public participation in Council deliberations is to be provided for and encouraged. This provision generally has been interpreted to be a vehicle to get a maximum amount of recovery assistance into a devastated area as quickly as possible.

The Federal Insurance Administration draws its authorities primarily from the National Flood Insurance Act of 1968, P.L. 90-448, 42 U.S.C. 1441, as amended by the Housing and Urban Development Act of 1968, P.L. 91-152, and the Housing and Community Development Act of 1974, P.L. 93-383, 42 U.S.C. 5301; and, the Flood Disaster Protection Act of 1973 P.L. 93-234, 42 U.S.C. 4001, as amended by the Housing Authorization Act of 1976, P.L. 94-375, 12 U.S.C. 1701.

Property owners may buy flood insurance at a rate lower than normal actuarial rates, reflecting a subsidy by the Federal Government. In communities in which actuarial rates have been determined, regular program coverage in terms of a second layer of coverage equal in amount to established limits may be purchased at actuarial rates.

Under the provisions of the Flood Disaster Protection Act of 1973, communities having one or more identified special flood hazard areas must enter into the National Flood Insurance Program or be denied Federal or federally-related financial assistance for acquisition or construction purposes within those areas.

Of the nearly 300 study units identified in the study, 188 are in communities covered by the National Flood Insurance program. As of May 4, 1979, 130 of these communities already were in the regular phase of the program; 55 still were in the emergency phase of the program; and three were not participating in the program.

Of the 58 (55 + 3):

36 have mapping studies underway

16 have mapping studies scheduled to start in FY '79

6 have no studies scheduled

2 have studies completed and are scheduled to convert to the regular program before the end of calendar year 1979

From the outset of the Flood Insurance Program, the minimum flood plain management requirements have been building requirements. That is, they have been directed primarily to structural rather than locational considerations.

The National Flood Insurance Act of 1968, as amended, provides authorities to the Secretary not only to identify and publish

information with respect to all flood plain areas (Sec. 1360(a)(1) and to establish flood risk zones (1360(a)(2), but also to: "develop comprehensive criteria designed to encourage, where necessary, the adoption of adequate State and local measures which..." will improve the management of flood prone areas; and, assist States and local governments to acquire properties located in flood risk areas and which are severely damaged by floods. These are important considerations in any plan to protect barrier islands from unwise development.

Council on Environmental Quality (CEQ)

The Council was established by the National Environmental Policy Act of 1969 (NEPA) (83 Stat. 852; 42 U.S.C. 4321 et seq.) to formulate and recommend national policies for improving the quality of the environment. The Office of Environmental Quality, which provides staff to the Council, was subsequently established by Title II of the Environmental Quality Improvement Act of 1970 (84 Stat. 114; 42 U.S.C. 4372).

Section 203 of NEPA established various duties and functions of the Council among which are:

- "to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information";
- "to review and appraise the various programs and activities of the Federal Government...to determine the extent to which they are contributing to achieving the goals of the Act";
- "to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation";
- "to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality";
- "to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes."

Section 4371(b)(1) of the Act establishing the Office of Environmental Quality recognizes that policies and statutes exist which properly implemented, would contribute significantly to improvement of the environment.

> "(b)(1) the Congress declares that there is a national policy for the environment which provides for the enhancement of environmental quality. This policy is evidenced by statutes heretofore enacted relating to the prevention, abatement, and control of environmental pollution, water and land resources, transportation, and economic and regional development."

The Act also recognizes that much of the responsibility for implementing these policies and statutes rest with State and local governments.

One of the stated purposes of establishing the Office was:

> "to assure that each Federal department and agency conducting supporting public works activities which affect the environment shall implement the policies established under law" (Sec. 4371(c)(1)

Among the stated duties and functions of the Office (Director) which have relevance to the barrier islands are:

b "reviewing the adequacy of existing systems for monitoring and predicting environmental changes in order to achieve effective coverage and efficient use of research facilities and other resources;"

o "promoting the advancement of scientific knowledge of the effects of actions and technology on the environment and encourage the development of the means to prevent or reduce adverse effects that endanger the health and well-being of man;"

o "assisting in coordinating among the Federal departments and agencies those programs and activities which affect, protect, and improve environmental quality;"

- "assisting the Federal departments and agencies in the development and interrelationship of environmental quality criteria and standards established through the Federal Government;"
- "collecting, collating, analyzing, and interpreting data and information on environmental quality, ecological research, and evaluation." (Sec. 4372(c)(3)-(7))

Floodplain Management, Executive Order 11988

Executive Order 11988, Floodplain Management, signed May 24, 1977, revoked and replaced Executive Order 11296 issued on August 10, 1966. It established new Federal policy for executive agencies and requires agencies to issue new or amended procedures to ensure the nonhazardous use of riverine, coastal and other floodplains. The Order directs Federal agencies to avoid, to the extent possible, the long and short term adverse impacts associated with activities in floodplains, and to avoid the direct or indirect support of floodplain development. With respect to barrier islands, it appears, based on floodplain maps for a sampling of areas, that a high percentage of the land area is located in floodplains covered by the Order.

The term "base floodplain" is used as the measurement for determining, in most cases, when the Order applies, and refers to the area subject to a flood having a one percent chance of occurring in any given year (100 year flood). The "critical action" floodplain is the other measurement used, and refers to the area having a 0.2 percent chance of flooding in any year (500 year flood).

Each agency has the responsibility to evaluate the potential direct and indirect effects of any actions it may take in a floodplain, and to ensure that its planning programs and budget requests reflect adequate consideration of flood hazards and floodplain management. If an agency proposes or supports an action in or affecting a floodplain, the head of the agency must make a finding that such an action is the only "practicable alternative." The agency then must "(1) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with section 2(d) of this Order, and (2) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain." For programs subject to the Office of Management and Budget Circular A-95, the agency must also notify the State and areawide A-95 clearinghouses for the geographic areas affected.

The Water Resources Council was directed to prepare guidance under the Order and to conduct periodic oversight of agency procedures and their effectiveness. The guidelines issued by the WRC on February 10, 1978, outline the major steps in the decisionmaking process an agency should follow when proposing an action which would be located in the base floodplain. The procedures recommended by the guidelines state that once an agency determines an action is located in the base floodplain (or critical action floodplain for proposals such as hospitals or facilities producing toxic water-reactive materials), the agency must then notify the public early enough for there to be a meaningful public input. The Order additionally requires agencies to consider all practicable alternatives to the proposal, including alternative siting or the alternative of taking no action. The impacts to the floodplain that would occur from the action must be fully identified. Adverse impacts must be minimized, and natural and beneficial floodplain values must be restored and preserved.

The agency would then reevaluate the proposed alternative taking into account the means to minimize impacts and maximize restoration of floodplains. If the agency head still finds that the only practicable alternative is locating the proposal in the floodplain, public notice of the reasons must be given in findings describing: (1) why the proposed action must be located in the floodplain; (2) significant facts considered in making the determination including alternative sites and actions; (3) conformity with State or local floodplain protection standards.

The WRC guidelines also state that the notice should explain: (1) the project modifications designed to minimize harm; (2) affects on natural and beneficial floodplain values; and (3) the inappropriateness of National Flood Insurance Program criteria, where applicable. After a brief comment period the agency may implement the proposed action. The guidelines issued by the Water Resources Council recognize that all of the above steps may not be appropriate to all agency actions. Every Federal agency was directed by the Order to develop its own regulations, but to date some agencies have been delinquent in completing their procedures. Some, notably the financial boards, have maintained that the Order does not apply to their operations activities.

Without the benefit of knowing how effective the Order will be, since it is not completely operational at present, the potential for substantial protection of the barrier islands clearly exists independent of any other recommendations made in this document. This is especially true in light of the responsibilities imposed on agencies by CEQ's NEPA regulations to mitigate adverse impacts and carry out promises made in the environmental review process. At least on paper, most agencies have reported to CEQ and WRC in June, August, and November 1978 that they are adhering to the policies contained in the and that their official procedures will be promulgated in final form shortly.

It will be necessary, however, to have effective oversight during the completion of agencies' (and especially sub-agency) regulations and during the operational phase. The Water Resources Council, the Domestic Policy Staff and Interior Department will also have some floodplain oversight responsibility under the new water resources policy. The Water Resources Council has no explicit oversight authority for ensuring an agency proposal's compliance once the procedures are established, though section 5 directs the WRC to periodically evaluate agency procedures and their effectiveness.

The Order itself reflects CEQ's willingness for WRC to take the lead in ensuring that agencies fully implement their procedures. This is proper since the Water Resources Council has been involved in floodplain management at the Federal and State level for many years, as typified by its influential 1976 publication, A Unified National Program for Floodplain Management. The Council on Environmental Quality could, however, serve alternatively in this role.

The Order does require any requests for new authorizations or appropriations transmitted to the Office of Management and Budget to indicate when a proposed action would be located in a floodplain, and if in a floodplain, whether the proposed action is in accord with the Order.

Effective implementation of the floodplains Executive Order should foster increased awareness within Federal agencies of the hazards of barrier island development, and will also set an example for State and local decisionmakers to become more conscious of the impact of their actions on floodplains, particularly when located on barrier islands.

Protection of Wetlands, Executive Order 11990

Executive Order 11990, issued on May 24, 1977, directs Federal agencies to provide leadership in minimizing the destruction, loss or degradation of wetlands. All agencies are ordered to avoid "to the extent possible" the destruction or modification of wetlands whenever there is "a practicable alternative." Like Executive Order 11988 relating to floodplains, the Order is both procedural and substantive, and applies to agencies involved in (1) acquiring, managing and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities affecting land use, including but not limited to water and related land resources planning, regulatory, and licensing activities.

The Wetlands Order was issued at the same time and contains many identical provisions as Executive Order 11988. The floodplain management guidelines issued by the Water Resources Council state that the guidance provided to agencies for the development of floodplain procedures will also frequently apply to wetlands review procedures. Agencies can optionally develop a single set of procedures for both Orders, and most have chosen to do so. Because the Orders are similar in content and are directed at actions which will frequently impact each other, only one set of coordinated procedures for each agency appears advantageous.

Identical provisions of the two Orders require: (1) the head of an agency to avoid undertaking or providing assistance for most Federal actions unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm; (2) early public review for new construction proposals located in wetlands; (3) requests for new authorizations or appropriations from the Office of Management and Budget to indicate whether the proposed action is in accord with the Order.

The Wetlands Order differs from the Floodplain Order, however, by specifically delineating the major factors agencies must consider when proposing an action located in a wetland area. The factors that must be considered are: the public health, safety, and welfare, including water supply, quality, recharge and discharge; pollution; flood and storm hazards; sediment and erosion; maintenance of natural systems including conservation and long term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources; recreational, scientific, and cultural uses.

The Order does not apply to private permits for activities involving wetlands on non-Federal property, because that would be duplicative of section 404 permits. The Wetlands Order also does not apply to any Federal activity as does the Floodplain Order, but only to new construct undertaken in or affecting wetlands. The Wetlands Order does, however, require Federal leases, easements, or deeds involving non-Federal parties to reference in the conveyance restricted uses as identified by any Federal, State or local wetlands regulations.

The review required by the Order is very comprehensive, and should have a wide application to many environmentally-damaging projects now undertaken by the Federal Government on or near barrier islands. As President Carter stated in the message accompanying the Order, "the problem of loss of wetlands arises mainly from unwise land use practices. The Federal Government can be responsible for or can influence these practices in the construction of projects, in the management of its own properties, and in the provisions of financial or technical assistance." The Order, although not quite as broad as the one for floodplains, will require Federal agencies to seek all practicable alternatives to new construction in wetlands, and hence should significantly reduce dredge and fill operations on the barrier islands as well as beach reconstruction, groin or seawall construction undertaken by the Corps of Engineers.

The advantages to unified or coordinated agency procedures are numerous. Especially for the barrier islands, almost all wetlands are located in floodplains. This means that, in most cases, Federal actions proposed in wetlands would have to comply with agency procedures developed in response to both the wetland and floodplain Executive Orders. Confusion could be created while the agency determined whether one or the other or both Orders applied. A unified strategy would reduce the possibility of confusion, and lessen the chances of a situation, for example, where a developer could manipulate one set of regulations against the other. Another reason why single or coordinated procedures should be encouraged is that actions in floodplains that are not actually located in a wetland will still often impact on the wetland. Unified procedures permit the full range of interdependent impacts to be considered completely and as a whole. As a consequence, a greater degree of protection fur the barrier islands should result.

Department of Transportation (DOT)

The Department of Transportation includes several agencies whose program authorities have great potential for impacting barrier islands. Two, the U.S. Coast Guard (U.S.C.G.) and the Federal Highway Administration (FHWA), are particularly important. A third, the Federal Aviation Administration (FAA), has a lesser impact on the islands.

The Coast Guard was established by the Act of January 28, 1915, 14 U.S.C. 1 and became a part of DOT on April 1, 1967.

Authority for approving permits to construct bridges over navigable water, including those necessary to connect barrier islands to the mainland (or to each other), was transferred from the Corps of Engineers to the U.S. Coast Guard by the DOT Act of 1966, 49 U.S.C. 1655(g)(6).

It has been the practice of the agency to issue bridge permits unless the structure would interfere with navigation. Because the costs of construction are likely to be prohibitive without convenient access, and because island property is unlikely to be marketable without a means of hurricane evacuation, bridges can be said to be the sine qua non of development on barrier islands.

Perhaps because neither the agency nor the public, until recently, has been particularly aware of the role that bridges play in promoting and making possible uncontrolled barrier islands development, the Coast Guard has not evaluated bridge permit applications on the basis of environmental, social and economic factors unrelated to navigation. In fairness, it should be noted that until recently (around 1973) bridges to barrier islands have not been controversial and, thus, the agency may not have been presented with an opportunity to deal squarely with the issue. However, the Coast Guard has no current regulations that spell out the regulatory test which the agency will apply in evaluating bridge proposals that lead to barrier island development, or that set forth the burden of proof which a bridge permit applicant must satisfy in order to qualify for a permit. While the Coast Guard does have NEPA regulations, these are not the equivalent of substantive regulatory standards, such as those adopted by the Corps under §10 of the 1899 Act.

The agency has been preparing environmental impact statements which outline the impacts of development that will follow bridge construction in some cases, but it remains to be seen whether these impacts will be considered as the basis for agency decisionmaking.

Equally unclear are Coast Guard policies with respect to the administration of other statutory requirements and considerations. The Department of Transportation, the parent agency, has adopted a wetlands protection policy. DOT Order No. 5660.1, May 21, 1975. While wetlands are usually found in association with barrier islands, the Coast Guard has yet to decide how it will apply the DOT policy to bridge and development cases.

Similarly, Section 4(f) of the DOT Act of 1966, 49 U.S.C. §1653(f), forbids the agency from sponsoring or approving projects that would use publicly-owned land that is important for wildlife and recreation, unless there are no feasible alternatives and all planning measures have been taken to reduce the impact of the project on public wildlife and recreational resources. An unresolved question is whether tidal marshlands, generally deemed "public trust" lands and certainly important for wildlife and recreation, come under the protection of §4(f), and what the Coast Guard policy in bridge cases affecting these marshes will be.

Further, the Coast Guard has no clear policy on how it will administer the bridge permit program so as not to prejudice or compromise the later administrative decisionmaking of other agencies.

Finally, the Coast Guard has not determined how it will deal with the Federal policies designed to prevent unsound development in flood-prone areas, such as those universally found on barrier islands.

The FHWA became a component of DOT by virtue of the DOT Act (80 Stat. 932). The FHWA administers the Federal-aid highway program of financial assistance to States for highway construction. Revenues derived from special taxes on highway users provide the Federal share of the financing for Federal-aid primary, secondary, and urban roads and streets. These funds generally are available on a 70% Federal--30% State or project sponsor matching basis. Special emphasis currently is being placed on deteriorating bridges.

The FHWA, with its multi-billion dollar per annum program, plays a large role in determining land use patterns in the country and has similar potential to do so on barrier islands.

There are environmental constraints placed on federally-funded highway building. Of particularly substantive import is Section 4(f) of the Department of Transportation Statute (49 U.S.C. 1653(f)) which protects significant, and publicly-owned, recreation areas, wildlife and waterfowl refuges, and parks against new highway building unless (a) there is no feasible and prudent alternative, and (b) then only if all efforts are made to minimize the harm to these protected areas. Since many barrier islands feature national or State wildlife refuges, parks or recreation areas (including State-owned stream beds used as important fisheries) that would be impacted by a new highway, Section 4(f) often will be applicable to a federally-funded highway on a barrier island.

However, Section 4(f) frequently is overlooked in cases of de facto wildlife sanctuaries or recreation areas (e.g., publicly-owned wetlands, or important natural fisheries); and when it is applied, findings of no feasible and prudent alternatives are often made.

The FAA also became a part of DOT in 1967 pursuant to the DOT Act. The FAA is charged with, among other responsibilities, promoting civil aviation and a national system of airports. Because of the problems of surface access to many barrier islands, air transport provides a reasonable means of access to some of the larger islands. Grants provided by the FAA to public agencies for airport development have the same potential for inducing growth on barrier islands as do other development oriented grant programs.

Table 17 in the environmental impact statement indicates that only nine of the nearly 300 study units now are accessible by air.

Department of Housing and Urban Development (HUD)

The Housing and Community Development Act of 1974 (P.L. 93-383), 42 U.S. 5301, merged several categorical grant programs into the Community Block Grant Program (CDBG) and authorized funds for a three year period. Title I of the Housing and Community Development Act of 1977 (P.L. 95-128) amended the earlier Act and extended funding authorization for CDBG for an additional three years. CDBG has become HUD's primary vehicle for providing community development assistance.

The CDBG program finances all activities previously eligible under urban renewal, neighborhood development, model cities, water and sewer, neighborhood facilities, public facilities, rehabilitation, open space, urban beautification and historic preservation grant programs.

Although the law does enumerate general objectives which the block grants are designed to fulfill, spending priorities are determined at the local level. Metropolitan cities and urban counties (having populations of at least 50,000 and 20,000 respectively) are guaranteed an amount called an "entitlement" which is based on a number of population, poverty, and housing factors. Smaller communities compete for the remaining "discretionary" funds on the same basis. The discretionary fund amounts to about 2% of the annual appropriation for CDBG purposes. As with most other Federal financial assistance programs, the CDBG guidelines do not differentiate between barrier islands or uplands.

UNDEVELOPED BARRIER ISLANDS

Islands or groups of islands which have (1) no development, (2) minor amounts of development not exceeding 10% of their total land area, or (3) 5,000 or more acres of undeveloped land area.

ISLAND NAME	ISLAND NUMBER		ACRES DEVELOPED	TOTAL ACRES	PERCENT DEVELOPED
Castle Neck	MA-02		1,250	1,300	4%
Duxbury	MA-09		1,000	1,100	9%
Ester	MA-19		180	200	10%
Mustegel	MA-20		350	350	0%
Cape Page	MA-21		700	700	0%
Edgartown	MA-23		450	500	10%
Tisbury	MA-24		270	300	10%
Nashawena	MA-25		150	150	0%
Cuttyhunk Island	MA-26		550	600	9%
Napatree	RI-04		90	100	10%
Stonington	RI-05		60	60	0%
Gardiners Island	NY-02		450	500	10%
Cedar Island	VA-05		4,250	4,300	1%
Fishermans Island	VA-10		1,500	1,500	0%
Bodie Island North	VA-11		7,600	8,100	9%
Bodie Island South	NC-01	(Developed)	38,400	45,500	16%
Ashe Island	NC-11	(Developed)	7,000	9,000	22%
Lee Island	NC-12		1,500	1,500	0%
Rich Inlet	NC-13		1,300	1,300	0%
Smith Island	NC-18		5,800	6,300	8%
Bird Island	NC-23		300	300	0%
Waites Island	SC-01		900	1,000	10%
Debidue Beach	SC-04		1,350	1,500	10%
Dewees Island	SC-13		1,500	1,600	7%
Morris Island	SC-16		2,800	2,900	4%
Kaiwah	SC-18		7,600	8,000	5%
Seabrook Island	SC-19		4,800	5,300	9%
Botany Bay I	SC-21				
Edisto Island	SC-22	(Developed)	14,900	16,200	8%
Pine Island	SC-23		2,200	2,200	0%
Otter Island	SC-24		3,600	3,600	0%

ISLAND NAME	ISLAND NUMBER		ACRES DEVELOPED	TOTAL ACRES	PERCENT DEVELOPED
Hunting Island	SC-25		5,700	6,000	5%
Fripp Island	SC-26		3,900	4,300	9%
Pritchards Island	SC-27		2,600	2,600	0%
Little Capers Island	SC-28		2,050	2,100	2%
Saint Phillips Island	SC-29		5,400	5,400	0%
Bay Point	SC-30		1,200	1,200	0%
Hilton Head	SC-31	(Developed)	9,000	22,000	59%
Daufuskie Island	SC-32		6,000	6,200	3%
Jones Island	SC-34		2,600	2,600	0%
Little Tybee Island	GA-02		6,800	6,800	0%
Ossabaw	GA-05		24,700	25,000	1%
Little Saint Simons	GA-10		9,000	9,000	0%
Saint Simons	GA-12	(Developed)	25,000	28,000	11%
Amelia Island	FL-01	(Developed)	10,500	16,100	35%
Bird Island	FL-02		100	100	0%
Guana Island	FL-04		3,600	4,000	10%
Mantanzas	FL-06		3,900	4,200	7%
Mosquito	FL-08	(Developed)	13,200	15,300	14%
Cocoa	FL-10	(Developed)	7,600	21,600	64%
Vero Beach Island	FL-11	(Developed)	11,200	14,700	23%
Hutchinson	FL-12	(Developed)	6,400	7,400	14%
Fisher Island	FL-20		190	200	5%
Cape Romano	FL-30		1,500	1,500	0%
Rice Island	FL-31		1,200	1,200	0%
Keewaydin	FL-33		2,900	3,000	3%
Big Hickory Island	FL-36		270	300	10%
Little Gasparilla Group	FL-44		1,260	1,400	10%
Bay Port	FL-62		140	150	7%
Pine Island	FL-63		95	100	5%
Chassonowitzka	FL-64		25,000	25,000	0%
Piney Island	FL-67		1,400	1,400	0%
Mashes Island	FL-68		1,500	1,600	6%
St. George Island	FL-71		5,800	6,300	8%
Miramar	FL-78	(Developed)	8,600	11,100	23%
Mobile Point	AL-03	(Developed)	14,600	17,300	16%

ISLAND NAME	ISLAND NUMBER		ACRES DEVELOPED	TOTAL ACRES	PERCENT DEVELOPED
Sand Island	AL-04		200	200	0%
Deer Island	MS-03		400	400	0%
Cat Island	MS-05		2,500	2,500	0%
Sable Island	LA-04		150	150	0%
Raccoon Point	LA-05		800	800	0%
Coquile Point	LA-06		2,000	2,200	9%
Bird Island	LA-07		50	50	0%
Pelican Island	LA-08		2,280	2,300	1%
Bastian Island	LA-09		1,300	1,300	0%
Joe Wise	LA-10		500	500	0%
Bay Lamer	LA-11		4,800	5,300	9%
Ronquille Island	LA-12		250	250	0%
Grand Terre Island Group	LA-13		2,400	2,500	4%
Isles Dernieres	LA-18		4,900	5,100	4%
High Island	TX-01	(Developed)	13,000	16,000	3%
Bolivar Peninsula	TX-02	(Undeveloped)	22,000	25,000	12%
Galveston Island	TX-03	(Undeveloped)	17,000	27,000	35%
Follets Island	TX-04		6,300	7,000	10%
Brazos	TX-05		3,100	3,300	7%
Cedar Lakes	TX-06		5,700	6,000	5%
Brown Cedar	TX-07		1,450	1,500	4%
Matagorda Peninsula E.	TX-08		11,100	11,300	2%
Matagorda Peninsula W.	TX-09		18,300	18,700	2%
St. Joseph Island	TX-11		24,200	24,400	1%
Mustang Island	TX-12	(Developed)	9,000	10,000	10%
Padre Island South	TX-15		14,100	15,000	6%
Boca Chica Island	TX-16		4,600	5,000	8%

PROTECTED BARRIER ISLANDS

ISLAND	NUMBER		
Sheepshot	ME-01		Reid State Park
Popham	ME-02		Popham Beach State Park
Plum Island	MA-02		Parker Rivers NWR, Plum Island State Park
Nahant	MA-05		
Long Beach	MA-10		
Sandy Neck	MA-11		
Great Island	MA-13		Cape Cod National Seashore
Nauset	MA-16		Cape Cod National Seashore
Monomoy	MA-17		Monomoy NWR
Katama Bay	MA-22		
Horseneck Beach	MA-27		Horseneck Beach State Preservation
Hammonasset Point	CT-01		Hammonasset Beach State Park
Maidstone Park	NY-04		
Northwest Harbor	NY-05		
Orient Beach	NY-07		Orient Beach State Park
Morton	NY-09		Morton NWR
Fire Island	NY-12	(Developed)	Fire Island National Seashore, Robert Moses State Park,
Jones Beach Island	NY-13	(Developed)	Gilgo State Park, Jones Beach State Park
Pullen Island	NJ-04		Brigantine NWR
Assateague North	MD-02		Assateague Island National Seashore, Assateague State Park
Assateague South	VA-01		Chincoteague NWR
Wallops Island	VA-02		NASA
Metomkin Island	VA-04		Nature Conservancy
Parromore Island	VA-06		Nature Conservancy
Hog Island	VA-07		Nature Conservancy
Cobb Island	VA-08		Nature Conservancy
Smith Island Group	VA-09		Nature Conservancy, State Natural Area
Hatteras Island	NC-02	(Developed)	Cape Hatteras N.S., Pea Island NWR
Ocracoke Island	NC-03		Cape Hatteras N.S.
Portsmouth Island	NC-04		Cape Lookout N.S.
Core Banks North	NC-05		Cape Lookout N.S.

ISLAND	NUMBER		
Core Banks South	NC-06		Cape Lookout N.S.
Shackleford Banks	NC-07		Cape Lookout N.S.
Hammock Island	NC-09		Hammock Beach State Park
Onslow Island	NC-10		Marine Corps Reservation
Masonboro Island	NC-16		Carolina Beach State Park
Carolina Beach Island	NC-17	(Developed)	Masonboro State Park
North Island	SC-05		State Wildlife Refuge
South Island	SC-06		State Wildlife Refuge
Cedar Island	SC-07		State Wildlife Refuge
Murphy Island	SC-08		State Wildlife Refuge
Cape Island	SC-09		Cape Romain NWR
Raccoon Key	SC-10		Cape Romain NWR
Bull Island	SC-11		Cape Romain NWR
Capers Island	SC-12		State Wildlife Refuge
Deveaux Banks	SC-20		Audubon Society Wildlife Refuge
Turtle Island	SC-33		State Wildlife Refuge
Williamson Island	GA-03		
Wassaw Island	GA-04		Wassaw NWR
St. Catherines Island	GA-06		John Noble Foundation
Blackbeard Island	GA-07		Blackbeard Island NWR
Sapelo Island	GA-08		State Wildlife Refuge
Wolf Island	GA-09		Wolf Island NWR
Jekyll Island	GA-13	(Developed)	Jekyll Island State Park
Little Cumberland Island	GA-14		Cumberland Island N.S.
Cumberland	GA-15		Cumberland Island N.S.
Little Talbot Island	FL-03		Little Talbot Island State Park
Anastasia Island	FL-05	(Developed)	Anastasia State Park, Butler State Park
Virginia Key	FL-21		
Cape Sable	FL-23		Everglades National Park
Mud Bay	FL-24		Everglades National Park
Shark Point	FL-25		Everglades National Park
Key McLaughlin	FL-26		Everglades National Park
Alligator Cove	FL-27		Everglades National Park
Duck Rock	FL-28		Everglades National Park
Ten Thousand Island	FL-29		Everglades National Park

ISLAND	NUMBER		
North Captiva Island	FL-41		
Cayo Costa	FL-42		
Casey Key	FL-46		
Passage Key	FL-51		Passage Key NWR
Egmont Key	FL-52		
Mullet Key Group	FL-53		
Caladesi Island	FL-59		Caladesi Island State Park
Honeymoon Island	FL-60		Caladesi Island State Park
Anclote Keys	FL-61		Caladesi Island State Park, Anclote Keys NWR
Seashore Keys	FL-65		Cedar Keys NWR
Cape San Blas	FL-74		St. Joseph Peninsula State Park
Crooked Island	FL-75		
Shell Island	FL-76		St. Andrews State Recreation Area
Santa Rosa Island	FL-79	(Developed)	Gulf Islands N.S.
Petit Bois Island	MS-01		Gulf Islands N.S.
Horn Island	MS-02		Gulf Islands N.S.
Ship Island	MS-04		
Chandeleur Island Group	LA-01		Brenton NWR
Grand Gosier Island	LA-02		State Wildlife Refuge
Breton Island	LA-03		Breton NWR
Caminada	LA-15		
East Timbalier Island	LA-16		
Matagorda Island	TX-10	(Developed)	Department of Defense Reservation
Padre Island North	TX-13		Padre Island N.S.
Padre Island Central	TX-14		Padre Island N.S.

NON-CATEGORIZED BARRIER ISLANDS

ISLAND	NUMBER
Small Point	ME-03
Seabrook	NH-02
Salisbury	MA-01
Towel	MA-04
Revere Beach	MA-06
Nobscusset Point	MA-12
Eastham	MA-15
Charlestown	RI-01
Weekapug	RI-02
Atlantic	RI-03
Block Island Beach	RI-06
Black Rock	CT-02
Fishers Island	NY-01
Fireplace	NY-03
Southampton	NY-10
Ludlam	NJ-08
Wrightsville Beach	NC-15
Sunset Beach Island	NC-22
Murrells Inlet	SC-02
Pawleys Island	SC-03
Sullivans Island	SC-15
Folly Island	SC-17
Sea Island	GA-11
Naples Park	FL-34
Bonita Beach	FL-35
Black Island	FL-37
Captiva Island	FL-40
Cabbage Key Group	FL-54
Cedar Keys	FL-66
Alligator Point	FL-69
Dog Island	FL-70
Indian Peninsula	FL-73
Perdido Key East	FL-80
Perdido Key West	AL-01
Romar Beach	AL-02
Timbalier Island	LA-17

APPENDIX C

NATURAL LANDMARKS ON BARRIER ISLANDS

The Natural Landmarks Program records were reviewed to inventory the status of natural landmarks on the study units used in the Barrier Island Protection Study. For each registered, eligible, or potential natural landmark, the natural features which possess, or appear to possess, attributes of national significance were identified. The attached chart summarizes this information.

The identified significant resource features are not necessarily all-inclusive. They tend to reflect the professional knowledge of those who studied the area. For example, the chart may show many significant vegetation characteristics for a particular island, but few for animal habitat. This does not necessarily mean that the island lacks significant animal habitat values. It may mean only that the investigators did not focus on the latter area or did not have sufficient information to list significant animal habitat values.

In some cases - notably the Virginia and Georgia barrier islands - a large number of barrier island study units were grouped together in a single landmark designation. Since the attributes of individual islands are not identified, the same attributes were applied to each unit in preparing the chart. This procedure may somewhat overstate the significance of particular natural landmarks on barrier islands. Since the islands within the groups are quite similar, this tendency should not significantly affect interpretation of the chart, however.

In a few cases, there are two landmarks within a single barrier island study unit. The significant resources features of the two landmarks were combined in preparing the body of the chart.

The reader will note that the chart contains many more entries for the Atlantic Coast than for the Gulf Coast. This is because studies are still in progress for the Gulf Coast, whereas they have been completed for the Atlantic. Unquestionably, many more barrier islands in the Gulf States will be shown to possess significant resource features when the latter study is completed.

The chart displays 72 entries. Of the 72, 17 have been officially designated either in whole or in part as natural landmarks by the Secretary of Interior (13 are registered, 4 are eligible). Of the remainder, experience indicates that about half will eventually be determined to contain nationally significant natural resources; the other half will be shown to contain resources of regional or local significance.

NATURAL LANDMARKS ON BARRIER ISLANDS

Barrier Island Unit and Study Number	Natural Landmark Status Register/Eligible/Potential			SIGNIFICANT RESOURCE FEATURES					
				Vegetation Types	Rare and Endangered Plants	Animal Habitat (Inc. those of R & E Species)	Aquatic Environment	Physiography	Aesthetics
N.H. **Hampton 01**			X						
Seabrook 02			X			waterbirds			
MA **Salisbury 01**			X		**rare species**				
Plum Island 02			X	saltmarsh				beach, dunes	
Humarock 08		X	X	Forest, salt & fresh water marsh		waterbirds	estuary, fish & shellfish nursery estuary		
Duxbury 09			X	Grassland			estuary		
Nauset 16			X	Grassland, saltmarsh		migrat. birds, waterfowl	estuary, fish & shellfish nursery		
Monomoy 17			X	various types		waterbirds, rare species	freshwater ponds	diversity	
Mustegat 20			X	various types		various			
Sandy Neck 11			X	various types		various		diversity	isolated, pristine
Nashawena 25			X	various types	rare species	various	freshwater ponds	diversity	
Cuttyhunk 26			X	various types	rare species	various	freshwater ponds	diversity	
Cape Page 21			X	various types	rare species	various	freshwater ponds	rare features	
Edgartown 23			X	Forest, swamp		various	ponds, nursery	various	
Tisbury 24			X	Forest, swamp		various	ponds, nursery	various	

NATURAL LANDMARKS ON BARRIER ISLANDS

Barrier Island Unit and Study Number	Natural Landmark Status Register/Eligible/Potential			SIGNIFICANT RESOURCE FEATURES Vegetation Types	Rare and Endangered Plants	Animal Habitat (Inc. those of R & E Species)	Aquatic Environment	Physiography	Aesthetics
R.I. Block Island 06			X	swamp, bog		various		diversity	
N.Y. Gardiner's Isl. 02		X		various		various	estuary	rare features	isolated, vistas
Orient Beach 07			X	forest	rare species	various	nursery		
Morton 09			X	various		various		.	
Hampton 11			X	saltmarsh		various		rare features	
Fire Island 12			X			various			
Long Beach 14			X	various		waterbirds, water fowl			
N.J. Barnegat 02			X	various		various	estuary, nursery	beach	
Long Beach 03			X	various		various	estuary, nursery	beach	
Brigantine 05			X	various		various	freshwater ponds		
Seven Mile Bch. 09	X		2X	various		various			

NATURAL LANDMARKS ON BARRIER ISLANDS

Barrier Island Unit and Study Number	Natural Landmark Status Register/Eligible/Potential			SIGNIFICANT RESOURCE FEATURES					
	Register	Eligible	Potential	Vegetation Types	Rare and Endangered Plants	Animal Habitat (Inc. those of R & E Species)	Aquatic Environment	Physiography	Aesthetics
DE									
Fenwick Isl. N. 02			X	various		various	nurseries		
Rehoboth 01			X	saltmarsh		various			
VA									
Assateague S. 01	X			various		various	freshwater ponds		
Wallops Island 02	X			salt & fresh marshes		various			
Assanomen 03	X			various		various	freshwater ponds, estuary	various	isolated, pristine
Metonkin 04	X			various		various	freshwater ponds, estuary	various	isolated, pristine
Cedar Island 05	X			various		various	freshwater ponds, estuary	diversity, beach	isolated, pristine
Parramore Isl. 06	X			various		various	freshwater ponds, estuary	diversity, beach	isolated, pristine
Hog Island 07	X			various		various	freshwater ponds, estuary	diversity, beach	isolated, pristine
Cobb Island 08	X			various		various	freshwater ponds, estuary	diversity, beach	isolated, pristine

SIGNIFICANT RESOURCE FEATURES

Barrier Island Unit and Study Number	Natural Landmark Status Register/Eligible/Potential			Vegetation Types	Rare and Endangered Plants	Animal Habitat (Inc. those of R & E Species	Aquatic Environment	Physiography	Aesthetics
VA Smith Island 09	X			various		various	freshwater ponds, estuary	diversity, beach	isolated, pristine
Fisherman's Isl. 10	X			various		various		rare features	
N.C. Bodie Isl. South 01		X		various	rare species		freshwater ponds	rare features, dunes	
Hatteras Island 02			X	various	rare species			rare features, dunes	
Bogue Banks 08			X	various		endangered species			
Hammock Island 09			X	forest		waterbirds, rare species		beach, dunes	vistas
Smith Island 16		X	X	various	rare species	waterbirds, endangered species		various	isolated, pristine, vistas
S.C. Murells Inlet 02			X	various		various	freshwater ponds	beach, dunes	vistas
Debidue Beach 04			X	various			estuary		
Bull Island 11			X	forest					isolated, pristine

NATURAL LANDMARKS ON BARRIER ISLANDS

Barrier Island Unit and Study Number	Natural Landmark Status Register/Eligible/Potential			SIGNIFICANT RESOURCE FEATURES Vegetation Types	Rare and Endangered Plants	Animal Habitat (Inc. those of R & E Species)	Aquatic Environment	Physiography	Aesthetics
S.C. Edisto Island 22			X	various		rare species		dunes	isolated, pristine
Hunting Island 25			X	various	rare species	rare, endangered species		beach, dunes	isolated, pristine, vistas
St. Phillips Isl. 29			X	various		rare, endangered species	freshwater ponds, nursery	various	isolated, pristine, vistas
GA Tybee Island 01			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
Ossabaw Island 05			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
St. Catherine's 06			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
Blackbeard Isl. 07			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
Sapelo Island 08			2X	various		various	freshwater ponds	beach, dunes	isolated, pristine

SIGNIFICANT RESOURCE FEATURES

Barrier Island Unit and Study Number	Natural Landmark Status Register/Eligible/Potential			Vegetation Types	Rare and Endangered Plants	Animal Habitat (Inc. those of R & E Species)	Aquatic Environment	Physiography	Aesthetics
GA									
Wolf Island 09			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
Little St. Simons 10			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
Little Cumberland Island 14			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
Cumberland Island 15			X	various		various	freshwater ponds	beach, dunes	isolated, pristine
Wassaw Island 04	X			various	rare species				isolated, pristine
FL									
Amelia 01			2X	various		various		dunes	
Bird Island 02			X	grassland		waterbirds			isolated, pristine
Little Talbot Isl. 03			X	various		endangered species		dunes	isolated, pristine
Guana Island 04			X	various		rare species		dunes	vistas

NATURAL LANDMARKS ON BARRIER ISLANDS

Barrier Island Unit and Study Number	Natural Landmark Status Register/Eligible/Potential			SIGNIFICANT RESOURCE FEATURES					
	Register	Eligible	Potential	Vegetation Types	Rare and Endangered Plants	Animal Habitat (Inc. those of R & E Species	Aquatic Environment	Physiography	Aesthetics
FL									
Jupiter Island 13	X			various		endangered species			isolated, pristine
St. Vincent Isl. 72			X			rare species	freshwater ponds		isolated, pristine
Shell Island 76			X	grassland		mammals			isolated, pristine
LA									
Chandeleur Isl. 01			X	swamp, saltmarsh		various		rare features, beaches	isolated, pristine
Breton Island 03			X	swamp, saltmarsh		various		rare features, beaches	isolated, pristine

APPENDIX D

NATIONAL REGISTER PROPERTIES ON BARRIER ISLAND STUDY UNITS

The following properties appear to be located on barrier island study units based on information available for both the units and the properties.

STATE	BARRIER ISLAND UNIT	NATIONAL REGISTER PROPERTY[1]
ME	Popham Beach 02	Popham Colony Site Fort Popham Memorial
	Biddleford Pool 06	Fletchers Neck Lifesaving Station
MA	Revere Beach 06	Slade Spice Mill
	Duxbury 09	Plymouth Light Station
	Eastham 15	Edward Penniman House and Barn
RI	Charlestown 01	Historic Village of the Naragansetts Fort Ningrete Indian Burial Ground
NY	Orient Beach 06	Orient Historic District
NJ	Sandy Hook 01	*Sandy Hook Light
	Barnegat 02	Barnegat Light Public School Barnegat Lighthouse
	Brigantine 05	U.S. Coast Guard Station
	Atlantic City 06	Absecon Lighthouse Morton Hotel Blenheim Hotel
	Wildwood 10	Hereford Lighthouse
VA	Assateague Island, S. 01	Assateague Lighthouse
	Metomkin Island 04	Bowman's Folly

[1] Properties which appear to be located within barrier island study units based on information available for both the units and the properties. Further investigation may reveal sites that were inappropriately included in the list and sites that were excluded, but such errors in the listing would be expected to average less than 5% of the total. This list is as of October 1978.

*National Historic Landmarks

STATE	BARRIER ISLAND UNIT	NATIONAL REGISTER PROPERTY
NC	Core Banks, N. 05	Cape Lookout Light Station
	Smith Island 18 (Cape Fear)	Orton Plantation St. Philip's Church Ruins
SC	Pawleys Island 03	Pawleys Island Historic District
	Sullivans Island 15	The Battery Gadsden The Battery Thomson The U.S. Coast Guard Historic District (Sullivans Island Station)
	Edisto Island 22	Windsor Plantation Black Hill Plantation Outbuildings *Brick House Ruin Edisto Island Presbyterian Church Middleton's Plantation Old House Plantation Peter's Point Plantation Presbyterian Manse William Seabrook House Spanish Mount Point (The Mound) Trinity Episcopal Church
	Hunting Island 25	Hunting Island State Park Lighthouse
	Hilton Head Island 31	Sea Pines Green's Shell Enclosure Skull Creek (Hilton Head)
GA	St. Catherine's Island 06	*St. Catherine's Island (Spanish mission and home of Button Gwinnett, signer of the Declaration of Independence)
	St. Simons Island 12	St. Simons Lighthouse Keeper's Building
	Jekyll Island 13	Faith Chapel Horton-Dubignon House, Brewery Ruins, and Dubignon Cemetery Jekyll Island Club Rockefeller Cottage
FL	Anastasia 05 Matanzas 06	Spanish Coquina Quarries Fort Matanzas National Monument
	Mosquito 08	Turtle Mound
	Cape Canaveral 09	Launch Complex #39, Kennedy Space Center

STATE	BARRIER ISLAND UNIT	NATIONAL REGISTER PROPERTY
FL	Hutchison Island 12	House of Refuge at Gilbert's Bar
	Jupiter Island 13	Jupiter Inlet Lighthouse
	Palm Beach 15	Bingham-Blossom House (Figulus) Breakers Hotel Complex Breisford House (Banyans) Henry Morrison Flagler House (White Hall) Mar-a-lago National Historic Site Paramount Theatre Building
	Fort Lauderdale 18	New River Inn (The City Hall Annex) Stranahan House
	Miami Beach 19	North Miami Beach Old Spanish Monastery
	Naples Park 34	Seaboard Coastline Railroad Depot
	Estero Island 38	Koreshan Unity Settlement Historic District Mound Key (Estero Bay)
	Sanibel Island 39	Sanibel Lighthouse and Keeper's Quarters
	Chassanowitzka 64	Yulee Sugar Mill Ruins
AL	Dauphin Island 05	Indian Mound Park
MS	Ship Island 04	Fort Massachusetts
LA	Grande Terre Island Group 13	Fort Livingston
TX	Galveston Island 02	Galveston Causeway (spans to the island) U.S.S. Hatteras (Outer Continental Shelf)
	Cedar Lakes 06	John McCroskey Cabin
	Brazos Island 16	Brazos Santiago Depot
TOTALS		
14 States	43 Study Units	76 National Register Properties

APPENDIX E

MANAGEMENT POLICY FOR SHORELINE PROCESSES IN AREAS OF THE NATIONAL PARK SYSTEM

In natural zones, shoreline process - erosion, deposition, dune formation, inlet formation, etc. - will be allowed to take place naturally, except where control measures, required by law or Service commitment, are necessary to protect life and property in neighboring areas.

In historic zones, control measures, if necessary, will be predicated on thorough studies taking into account the nature and rate of the shoreline processes, the threat to the cultural resource, the significance of the cultural resources, and alternatives including costs for protecting the cultural resource. Such studies must also determine if and how control measures would impair resources and processes in natural zones, in order that management may make an informed decision on the course of action to be followed.

In development zones, management should plan to phase out, systematically relocate, or provide alternative developments to facilities located in hazardous areas. New facilities will not be placed in areas subject to flood or wave erosion hazard unless it can be demonstrated that they are essential to meet the park's purpose, that no alternative locations are available, and that the facilities will be reasonably assured of surviving during their planned lifespans without the need for shoreline control measures. Before development in such areas is provided, the requirements of Executive Order 11968, "Floodplain Management," must be fulfilled. Where erosion control is required by law, or where present developments must be protected to achieve park management objectives, the Service will employ the most natural appearing and effective method feasible.

Most shoreline areas of the National Park System are part of larger physiographic and ecological systems, and the processes of these larger systems directly affect the management of those NPS areas contained therein. Therefore, the Service shall seek to obtain the assistance of appropriate Federal, State, and local agencies in carrying out the management objectives of NPS shoreline areas.

The Service will cooperate with State and other Federal entities to develop strategies for maintaining existing transportation and utility links on barrier islands in the event of storm damage or inlet formation. Where these links are interrupted by inlet formation, the Service will recommend, within the limits of practicality, reestablishment in a manner that allows the unimpeded operations of inlet formation and closure.

Where navigation channels are established in NPS waters, the Service will work with the responsible agency to see that necessary dredging is carefully controlled and that dredged material is disposed of in such a manner as to have the least adverse impact on the aquatic ecosystem and to optimize the value of spoil deposit as wildlife habitat.

APPENDIX F

BARRIER ISLAND INVENTORY

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                                              Appendix F
   TODAYS DATE 04/05/79             UNITED STATES DEPARTMENT OF THE INTERIOR                          PAGE F-1
                                   HERITAGE CONSERVATION & RECREATION SERVICE
                          RESULTS OF INQUIRY AGAINST THE ISLANDS INVENTORY MASTERFILE

                                   BARRIER ISLANDS SUMMARY                                  1790.

   AL13 AL   BALDWIN   MOBILE POINT                       700          17100 2 1   2100     300   16400  21
   AL?? AL   BALDWIN   PERDIDO KEY WEST                                 1500 2 1    900           1700   2
   AL?? AL   BALDWIN   [illegible] BEACH                 1000           3000 2 1    800    1800   2200   8
   AL?? AL   MOBILE    DAUPHIN ISLAND                          100      6500 3 1   1300     100   5?00  19
   AL?? AL   MOBILE    SAND ISLAND                                       300 1 1                  300   3

   FEDNGI=          ST.NGI=   1700  OTHNGI=   100  PRVNGI= 26080  A1ACRS=  5380  A2ACRS=  1350  A3ACRS= 21780  B=MILE=    48

   CT1? CONN, FAIRFIELD  BLACK ROCK                                      500 ? 1    350            150   2
   CT1? CONN, FAIRFIELD  PLEASURE BEACH/LONG BEACH             125         ? 1     70      67            3
   CT1? CONN, MIDDLESEX  MENUNKETESUCK ISLAND                             18 1 1                          1
   CT1? CONN, NEW HAVEN  HAMMONASSET BEACH              495               21 1 1             696     18   3
   CT1? CONN, NEW HAVEN  HAMMONASSET POINT              800                2 1    250      658     21   3
   CT1? CONN, NEW HAVEN  MILFORD POINT                           9        95 1 1               9            2
   CT1? CONN, NEW HAVEN  SANDY POINT AND MORSE PARK             40           1 1              40     85   7
   CT1? CONN, NEW LONDON BLACK POINT BEACH                                50 1 1              50            8
   CT1? CONN, NEW LONDON BLUFF POINT                     30                  1 1              30            2
   CT1? CONN, NEW LONDON GOSHEN COVE BEACH                3               22 1 1              25            1
   CT1? CONN, NEW LONDON GRISWOLD POINT                                   37 1 1              37
   CT1? CONN, NEW LONDON HATCHETT POINT                                   10 ? 1               9      9     1
   CT1? CONN, NEW LONDON JORDAN COVE BEACH                                15 1 1                     15     1
   CT1? CONN, NEW LONDON OCEAN BEACH PARK/HARKNESS SPIT          65          1 1              65            1

   FEDNGI=          ST.NGI=   1617  OTHNGI=   215  PRVNGI=   730  A1ACRS=   678  A2ACRS=  1790  A3ACRS=   246  B=MILE=    22

   DE?? DEL  SUSSEX    FENWICK ISLAND NORTH                   500          2500 3 8   1700     500   1600  11
   DE?? DEL  SUSSEX    REHOBOTH                   1000       1000   182    6180 3 8   1600    3600   2500  14

   FEDNGI=   1000  ST.NGI=   7000  OTHNGI=   180  PRVNGI=  1000  A1ACRS=  2000  A2ACRS=  3100  A3ACRS=  4100  B=MILE=    25

   THE COLUMNS PRINTED ABOVE ARE LEFT TO RIGHT:
   ZIPNO,STNAME,CNTYNM,ISLNM,FEDNGI,ST.NGI,OTHNGI,PRVNGI,$ CODE,LNG,NC,A1ACRS,A2ACRS,A3ACRS,B=MILE.
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BARRIER ISLANDS SUMMARY

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TODAYS DATE 04/05/79              UNITED STATES DEPARTMENT OF THE INTERIOR                                      PAGE  F-3
                                  HERITAGE CONSERVATION & RECREATION SERVICE
                           RESULTS OF INQUIRY AGAINST THE ISLANDS INVENTORY MASTERFILE

                                  BARRIER ISLANDS SUMMARY                           1254.

  FL37 FL   MONROE      ALLIGATOR CAVE             35000                          1 0          35000          18
  FL27 FL   MONROE      CAPE SABLE                  4100                          1 0           4100          17
  FL38 FL   MONROE      DUCK ROCK                  20000                          1 0          20000          13
  FL34 FL   MONROE      KEY MCLAUGHLIN IN          19300                          1 0          19300           7
  FL36 FL   MONROE      MUD BAY                     8000                          1 0           8000           6
  FL35 FL   MONROE      SHARK POINT                50000                          1 0          50000          15
  FL01 FL   NASSAU      AMELIA ISLAND                      1000           18100   3 1    5670    1000    9500  16
  FL78 FL   OKALOOSA    MIRAMAR                      100                  11800   2 0    2950     100    9500  13
  FL16 FL   PALMBEACH   BOCA RATON                                  200    2500   5 1    2300     200     200  16
  FL14 FL   PALMBEACH   LAKE WORTH                                          900   4 1     600             200   6
  FL15 FL   PALMBEACH   PALM BEACH                                  100    3300   5 1    3100     100     200  16
  FL41 FL   PASCO       ANCLOTE KEYS                  50    200             250   1 1             250     250   3
  FL54 FL   PINELLAS    CABBAGE KEY GROUP                           400     500   3 1     400     400     100   2
  FL50 FL   PINELLAS    CALADESI ISLAND                     700                   1 1             700           7
  FL58 FL   PINELLAS    CLEARWATER BEACH ISLAND                     100    1300   4 1    1200     100     100   3
  FL48 FL   PINELLAS    HONEYMOON ISLAND                    700                   2 1     100     600           7
  FL55 FL   PINELLAS    LONG KEY                                    100    1500   5 1    1300     100     200   4
  FL53 FL   PINELLAS    MULLET KEY GROUP                           1700           7 1     900     700           6
  FL57 FL   PINELLAS    SAND KEY                                    150    3350   6 1    2600     100    1000  16
  FL56 FL   PINELLAS    TREASURE ISLAND                             100    1000   5 1     850     100     150   4
  FL95 FL   ST.JOHNS    ANASTASIA                          8000            1200   3 0    1000    8000          16
  FL96 FL   ST.JOHNS    GUANA ISLAND                                       6000   7 1     400            5600  15
  FL12 FL   ST.LUCIE    HUTCHINSON                                  100    7300   2 1    1000     100    6300   2
  FL79 FL   SANTA ROSA  SANTA ROSA ISLAND           7500   2000            1700   7 1    2700    8500          60
  FL46 FL   SARASOTA    CASEY KEY                                          1050   1 1     500             500   7
  FL48 FL   SARASOTA    LIDO KEY                                    100    1100   4 1     900     100     200   7
  FL43 FL   SARASOTA    LONGBOAT KEY                                       2000   4 1    1200            1200  18
  FL45 FL   SARASOTA    MANASOTA KEY                        100     100    1400   4 0    1100     200     500  17
  FL47 FL   SARASOTA    SARASOTA                                    100    2750   5 1    2400     100     300   8
  FL07 FL   VOLUSIA     FLAGLER                             200           11900   4 1    8000     200    3100  37
  FL28 FL   VOLUSIA     MOSQUITO                    4000                  11300   2 1    2100    4000    9700  28
  FL58 FL   WAKULLA     MASHES ISLAND                                      1600   7 0     100            1500   3
  FL57 FL   WAKULLA     PINEY ISLAND                                       1400   1 0                    1400   4

  FEDMGT= 212110  ST MGT= 32980  OTHMGT=  2575  PRVMGT= 215125  A1ACRS= 193445  A2ACRS= 233735  A3ACRS= 138520  R-MILS=  281


THE COLUMNS PRINTED ABOVE ARE LEFT TO RIGHT:
FORMP,STNAME,CNTYNM,ISL NM,FEDMGT,ST MGT,OTHMGT,PRVMGT,A CODE,UPBLDC,A1ACRS,A2ACRS,A3ACRS,R-MILS.
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TODAYS DATE 04/05/79          UNITED STATES DEPARTMENT OF THE INTERIOR                               PAGE  I-4
                              HERITAGE CONSERVATION & RECREATION SERVICE
                         RESULTS OF INQUIRY AGAINST THE ISLANDS INVENTORY MASTERFILE

                              BARRIER ISLANDS SUMMARY                     1254.

GA06 GA   LIBERTY    ST. CATHERINES ISLAND                          15030 1 0         15000          11
GA15 GA   CAMDEN     CUMBERLAND ISLAND           19690        3000   7600 2 0   782   14400   7700   17
GA14 GA   CAMDEN     LITTLE CUMBERLAND ISLAND                        2400 2 0   700           2200    3
GA02 GA   CHATHAM    LITTLE TYBEE ISLAND                             6900 1 1                 6800    3
GA05 GA   CHATHAM    OSSABAW ISLAND                    25000              2 0   300          24700   10
GA01 GA   CHATHAM    TYBEE ISLAND                                    4100 3 1  1000           3100    3
GA04 GA   CHATHAM    WASSAW ISLAND                9400                300 1 1          9000    300    6
GA03 GA   CHATHAM    WILLIAMSON ISLAND                   300              1 1           300           2
GA13 GA   GLYNN      JEKYLL ISLAND                      6050              3 3  3500    3000           8
GA10 GA   GLYNN      LITTLE ST. SIMONS                               9000 1 0                 9000    6
GA11 GA   GLYNN      SEA ISLAND                                      2000 3 0   700           1300    5
GA12 GA   GLYNN      ST. SIMONS ISLAND                          100 27900 2 0  3000     100  24000    3
GA07 GA   MCINTOSH   BLACKBEARD ISLAND            5600                    1 0          5600           8
GA08 GA   MCINTOSH   SAPELO ISLAND                     13500         4500 2 0   300   13500   4200    5
GA09 GA   MCINTOSH   WOLF ISLAND                  5100               2200 1 0          5100   2200    3

FEDMGT=  38100  ST MGT=  44900  OTHMGT=   3100  PRVMGT=  81680  #1ACRS=   8780  #2ACRS=  71800  #3ACRS=  85900  A-MILS=

LA15 LA   JEFFERSON  CAMINADA                                   130   100 2 0    10     100     90    2
LA16 LA   JEFFERSON  GRAND ISLE                    100   500         3400 3 0  1900     600   1500    7
LA13 LA   JEFFERSON  GRAND TERRE ISLAND GROUP            200         2300 2 0   100     200   2200    6
LA14 LA   LAFOURCHE  EAST TIMBALIER ISLAND               900          500 2 0   100     900    400    8
LA09 LA   PLAQUEMINE BASTIAN ISLAND                                  1300 1 0                 1300    5
LA11 LA   PLAQUEMINE BAY LANFO                                       5300 3 0   900           4400    9
LA07 LA   PLAQUEMINE BIRD ISLAND                                       50 1 0                   50    1
LA03 LA   PLAQUEMINE BRETON ISLANDS               1000                    1 0    50     950           9
LA06 LA   PLAQUEMINE COQUILLE POINT                                  2200 1 0   200           2000    4
LA02 LA   PLAQUEMINE GRAND GOSIER ISLAND                              370 1 0                  370    5
LA10 LA   PLAQUEMINE JOE WISE                                         520 1 0                  520    3
LA08 LA   PLAQUEMINE PELICAN ISLAND                                  2300 1 0    20           2280    3
LA05 LA   PLAQUEMINE RACCOON POINT                                    800 1 0                  800    3
LA12 LA   PLAQUEMINE [illegible] ISLAND                               290 1 0                  290    1
LA04 LA   PLAQUEMINE SABLE ISLAND                                     150 1 0                  150    1
LA01 LA   ST.BERNARD CHANDELEUR ISLAND GROUP      6500               3700 1 0          6500   3700   34
LA19 LA   TERREBONNE ISLES DERNIERES                            200  4600 2 0   700     200   3900   17
LA17 LA   TERREBONNE TIMBALIER ISLAND                           200  4200 2 0   900     200   3300    8

FEDMGT=   7600  ST MGT=   1600  OTHMGT=    530  PRVMGT=  31420  #1ACRS=   3980  #2ACRS=   9850  #3ACRS=  27490  A-MILS=    117

THE COLUMNS PRINTED ABOVE ARE LEFT TO RIGHT:
 FORM#,STNAME,CNTYNM,ISL NM,FEDMGT,ST MGT,OTHMGT,PRVMGT,& CODE,URBLOC,#1ACRS,#2ACRS,#3ACRS,A-MILS.
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                         RESULTS OF INQUIRY AGAINST THE ISLANDS INVENTORY MASTERFILE
                                                                                                   page I-5
                                        BARRIER ISLANDS SUMMARY                    1984.

 NY16 N.Y.  NASSAU      LONG BEACH                                  600   2000 4 1   2000    600           920
 NY15 N.Y.  QUEENS      ROCKAWAY                      300           500   3200 4 1   3200    800            18
 NY17 N.Y.  SUFFOLK     FIRE ISLAND                  2000   1000   1500   2400 3 1   1900   4500    500    37
 NY03 N.Y.  SUFFOLK     FIREPLACE                                    60     50 3 0     50     60             1
 NY01 N.Y.  SUFFOLK     FISHERS                       100           100    500 4 0    500    200             2
 NY02 N.Y.  SUFFOLK     GARDINERS IS. BEACHES                              500 2 0     50           450      5
 NY11 N.Y.  SUFFOLK     HAMPTON                                     300   2400 1 1   1050    300   1350     16
 NY13 N.Y.  SUFFOLK     JONES BEACH IS.                     3000   2000   6700 2 1   1700   5000   5000     15
 NY04 N.Y.  SUFFOLK     MAIDSTONE PARK                               80     60 2 0     60     80             8
 NY09 N.Y.  SUFFOLK     NOYTON                        250                      1 0           250             2
 NY08 N.Y.  SUFFOLK     NORTH HAVEN                                        150 1 0    150                    2
 NY05 N.Y.  SUFFOLK     NORTHWEST HARBOR                            100        2 0     10     90             2
 NY07 N.Y.  SUFFOLK     ORIENT BEACH                         400               2 0     50    350             4
 NY06 N.Y.  SUFFOLK     SHELTER ISLAND                                     600 3 0    450           150      2
 NY10 N.Y.  SUFFOLK     SOUTHAMPTON                                  50    650 3 1    150     50    500      4

 FEDWGT=  2650  ST WGT=  4400  OTHWGT=  5290  PRVWGT=  17990  #1ACRES=  11700  #2ACRES=  12240  #3ACRES=  6950  B-MILES=  1026

 NC23 N.C.  BRUNSWICK   BIRD ISLAND                                        300 1 0                  300      1
 NC21 N.C.  BRUNSWICK   HOLES BEACH ISLAND                                2300 3 0   1000          1300      6
 NC20 N.C.  BRUNSWICK   HOLDEN BEACH ISLAND                               2000 3 0   1000          1000      8
 NC19 N.C.  BRUNSWICK   OAK ISLAND                    100                 5000 3 0   2000    100   3000     13
 NC18 N.C.  BRUNSWICK   SMITH ISLAND (CAPE FEAR)             500          5000 2 0    500    500   4500      9
 NC22 N.C.  BRUNSWICK   SUNSET BEACH ISLAND                               2000 3 0    900          1100      7
 NC08 N.C.  CARTERET    BOGUE BANKS                         3000          6000 3 0   3000   3000   3000     25
 NC05 N.C.  CARTERET    CORE BANKS NORTH             1900                  100 1 0          1900    100     10
 NC06 N.C.  CARTERET    CORE BANKS SOUTH             3300                      2 0    500   2800            30
 NC04 N.C.  CARTERET    PORTSMOUTH ISLAND            5000                      2 0    400   4600             8
 NC07 N.C.  CARTERET    SHACKLEFFORD BANKS                                2000 1 0                 2000      9
 NC01 N.C.  CURRITUCK   BODIE ISLAND SOUTH           6000    400    100  10000 2 0   7100   6500   2900     58
 NC02 N.C.  DARE        HATTERAS ISLAND             15000                 2000 2 0   1000  15000   1000     51
 NC03 N.C.  HYDE        OCRACOKE ISLAND              6500                  500 2 0    500   6500            16
 NC17 N.C.  NEWHANOVER  CAROLINA BEACH IS.           2700   1600          2700 3 1   2200   4300    500     11
 NC16 N.C.  NEWHANOVER  FIGURE EIGHT IS.                                  4000 2 1   1000          3000      4
 NC14 N.C.  NEWHANOVER  MASON BORO ISLAND                   3700               1 1          3700             8
 NC15 N.C.  NEWHANOVER  WRIGHTSVILLE BEACH                                1700 4 1    900           800      3
 NC11 N.C.  ONSLOW      ASHE ISLAND                                       9000 2 1   2000          7000     22
 NC09 N.C.  ONSLOW      HAMMOCKS ISLAND                     7000           100 1 0          7000    100      3
 NC10 N.C.  ONSLOW      ONSLOW                       2500                  900 2 0    100   2500    800     11
 NC12 N.C.  PENDER      LEA ISLAND                                        1500 1 1                 1500      1
 NC13 N.C.  PENDER      RICH INLET                                        1300 1 1                 1300      3

 FEDWGT=  65600  ST WGT=  1210.  OTHWGT=  100  PRVWGT=  87800  #1ACRES=  23700  #2ACRES=  57100  #3ACRES=  65600  B-MILES=  314

 RI03 R.I.  WASHINGTON  ATLANTIC                              50           250 3 0    200     50     50      3
 RI04 R.I.  WASHINGTON  BLOCK ISLAND BEACH                          100    300 2 0     50    100    250      6
 RI01 R.I.  WASHINGTON  CHARLESTOWN                          400    200   1900 3 1    900    600   1000      8

 RI06 R.I.  WASHINGTON  NAPATREE                                           100 2 0     10            90      1
 RI05 R.I.  WASHINGTON  STONINGTON (SANDY POINT)                            60 1 0                   60      1
 RI02 R.I.  WASHINGTON  WEEKAPAUG                            100           200 4 1    200    100             2

 FEDWGT=        ST WGT=  550  OTHWGT=  300  PRVWGT=  2810  #1ACRES=  1360  #2ACRES=  850  #3ACRES=  1450  B-MILES=  18
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TODAYS DATE 06/05/79                 UNITED STATES DEPARTMENT OF THE INTERIOR                      PAGE I-5
                                      HERITAGE CONSERVATION & RECREATION SERVICE
                                RESULTS OF INQUIRY AGAINST THE ISLANDS INVENTORY MASTERFILE

                                           BARRIER ISLANDS SUMMARY                   1254.

ME06 MAINE CUMBERLAND PINE POINT                                   70     250 4 1    120                     3
ME02 MAINE SAGADAHOC  POPHAM BEACH                     310                360 3 0    360    310              7
ME01 MAINE SAGADAHOC  SHEEPSCOT                        400                    3 0     60    360              3
ME03 MAINE SAGADAHOC  SMALL POINT                                         360 3 0    180            240      2
ME08 MAINE YORK       BIDDEFORD                                    40     150 4 1    150     40              1
ME05 MAINE YORK       GOOSE CREEK                                          70 4 1     70                     1
ME07 MAINE YORK       GOOSE ROCKS                                         210 4 1    210                     1
ME09 MAINE YORK       OGUNQUIT                    60                      270 4 1    270     60              3
ME09 MAINE YORK       WELLS BEACH                                         310 4 1    310                     3

  FEDMGT=    60  ST MGT=   710  OTHMGT=   110  PRVMGT=  1760  #1ACRS=  1460  #2ACRS=   310  #3ACRS=   240  R-MILS=    17

MD02 MD    WORCESTER  ASSATEAGUE NORTH            6000    300             250 2 0    400  10200    100 21
MD01 MD    WORCESTER  FENWICK ISLAND SOUTH                       250     3300 1 0   2000    700   1300  0

  FEDMGT=  6000  ST MGT=   700  OTHMGT=   200  PRVMGT=  3500  #1ACRS=  2400  #2ACRS= 10900  #3ACRS=  1400  R-MILS=    32

MA15 MASS  BARNSTABLE EASTHAM                      700                    700 1 0    700    600    300  3
MA13 MASS  BARNSTABLE GREAT ISLAND                 700                        2 0     60    450         4
MA17 MASS  BARNSTABLE MONOMOY                     2700                        1 0           2700         9
MA14 MASS  BARNSTABLE NAUSET                      2600                    500 3 0    400   3000        12
MA12 MASS  BARNSTABLE NOBSCUSSET POINT                           700      900 4 0    600    700    100  3
MA16 MASS  BARNSTABLE PROVINCELANDS               8050                   2600 2 0   1500   6200   1000 14
MA11 MASS  BARNSTABLE SANDY NECK                                2900          2 0    700   2700         5
MA27 MASS  BRISTOL    HORSENECK BEACH                    1000                 3 0    800   1000         4
MA21 MASS  DUKES      CAPE POGE                                  300      400 1 0           300    400  7
MA26 MASS  DUKES      CUTTYHUNK ISLAND              20            20      450 2 0     60     60    400  4
MA23 MASS  DUKES      EDGARTOWN                                           600 2 0     50           450  5
MA22 MASS  DUKES      KATAMA BAY                                 100      100 2 0     70    100     80  2
MA25 MASS  DUKES      NASHAWENA                                           150 1 0                  150  1
MA24 MASS  DUKES      TISBURY                                             300 2 0     30           270  3
MA03 MASS  ESSEX      CASTLE NECK                         300            1000 2 1     50    300    950  5
[illegible] MASS  ESSEX      NAHANT                              200             100 2 1    100    200         4
MA02 MASS  ESSEX      PLUM ISLAND                 2100    100            1100 2 1    600   2700    900  8
MA01 MASS  ESSEX      SALISBURY                           150            1350 3 1    600    150    250  4
[illegible] MASS  ESSEX      [illegible]                                    150      650 3 1    300    150    150  1
MA18 MASS  NANTUCKET  COATUE                                     800     1010 2 0    100    800    800 10
MA19 MASS  NANTUCKET  ESTER                                               700 2 0     70           100  2
MA20 MASS  NANTUCKET  MUSKEGET                                            350 1 0                  350  3
[illegible] MASS  NORFOLK    NANTASKET BEACH                                100      800 5 1    800    100         3
MA30 MASS  PLYMOUTH   DUXBURY                       50            50     1000 2 1    100    100    800  8       1
MA28 MASS  PLYMOUTH   HUMAROCK                     100           100     1600 4 1   1400    700    700  7
MA31 MASS  PLYMOUTH   LONG BEACH                                 200          2 0     20    180         3
[illegible] MASS  SUFFOLK    REVERE BEACH                                   100      600 6 1    600    100    700  2

  FEDMGT= 12875  ST MGT=  2550  OTHMGT=  5875  PRVMGT= 17150  #1ACRS=  8390  #2ACRS= 10580  #3ACRS=  9670  R-MILS=   138

THE COLUMNS PRINTED ABOVE ARE LEFT TO RIGHT:
 FORM#,STNAME,CNTYNM,ISL NM,FEDMGT,ST MGT,OTHMGT,PRVMGT,& CODE,URBLOC,#1ACRS,#2ACRS,#3ACRS,R-MILS,
    TODAYS DATE 03/29/79                UNITED STATES DEPARTMENT OF THE INTERIOR                        PAGE I-2
                                        HERITAGE CONSERVATION & RECREATION SERVICE
                                   [illegible] OF INQUIRY AGAINST THE ISLANDS [illegible]

                                        BARRIER ISLANDS SUMMARY                          1984.

    MS05 MISS  HARRISON   CAT ISLAND                                          2500 1 1                   2500  4
    MS03 MISS  HARRISON   DEER ISLAND                                          400 1 1                    400  5
    MS04 MISS  HARRISON   SHIP ISLAND                      1000                  2 1     100    1400           8
    MS02 MISS  JACKSON    HORN ISLAND                      3000                300 1 1            3700    300 16
    MS01 MISS  JACKSON    PETIT BOIS ISLAND                1000                100 2 1     100    1500           8

    FEDMST*   4700  ST.NST*        OTHMST*        PRVMST*  3300  $1ACRS*   200  $7ACRS*  6100  $3ACRS*  3700  B-MILS*    44

    NH01 N.H.  ROCKINGHAM HAMPTON                                  300    300  100 5 0     600     100             3
    NH02 N.H.  ROCKINGHAM SEABROOK                                             600 3 0     300             300     1

    FEDNH*          0 ST NST*   700 OTHMST*   200 PRVMST*   700 $1ACRS*   700 $7ACRS*   100 $3ACRS*   300 B-MILS*     3

    NJ06 N.J.  ATLANTIC   ATLANTIC CITY                                       600   5000 4 1    6900     600    1600   8
    NJ05 N.J.  ATLANTIC   BRIGANTINE                                          500   4600 3 1    1000     500    3000   7
    NJ04 N.J.  ATLANTIC   PULLEN ISLAND/LITTLE BEACH ISL.  1900                      1 1          -1000-           3
    NJ08 N.J.  CAPE MAY   LUDLAM                                              300   3700 3 1     900     300    2300   8
    NJ07 N.J.  CAPE MAY   OCEAN CITY                               200        700   6000 3 1    2700     600    1800   9
    NJ09 N.J.  CAPE MAY   SEVEN MILE BEACH                         300        400   4500 3 1    7100     900    3600   8
    NJ10 N.J.  CAPE MAY   WILDWOOD                          900               400   6500 4 0    2400    1000    7100   8
    NJ01 N.J.  MONMOUTH   SANDY HOOK                       1100    400              1500 4 1    2400     400          13
    NJ02 N.J.  OCEAN      BARNEGAT                                2600        800   3800 3 1    3100    3100          27
    NJ03 N.J.  OCEAN      LONG BEACH ISLAND                 300               300   4200 4 1    3000     500    2300  21

    FEDNJ*   3900  ST.NST*   7500  OTHMST*   3600  PRVMST*  37200  $1ACRS*  22100  $7ACRS*   9600  $3ACRS*  15300  B-MILS*   108


    THE COLUMNS PRINTED ABOVE ARE LEFT TO RIGHT:
    FID,[illegible],ISLAND,[illegible],FEDMST,ST NST,OTHMST,PRVMST,& COMP,URBAN,$1ACRS,$7ACRS,$3ACRS,B-MILS.
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UNITED STATES DEPARTMENT OF THE INTERIOR

RESULTS OF SURVEY AGAINST THE ISLANDS INVENTORY MASTERFILE

BARRIER ISLANDS SUMMARY

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   TODAYS DATE 04/09/79                  UNITED STATES DEPARTMENT OF THE INTERIOR                             PAGE I-9
                                           HERITAGE CONSERVATION & RECREATION SERVICE
                                     RESULTS OF INQUIRY AGAINST THE ISLANDS INVENTORY MASTERFILE

                                          BARRIER ISLANDS SUMMARY                              1754.

   TX03 TEXAS GALVESTON  GALVESTON ISLAND                  500    2000    1500   23000 3 1   10000    6000   13000  31
   TX16 TEXAS KENEDY     PADRE ISLAND CENTRAL            25000                         1 0            25000          45
   TX13 TEXAS KLEBERG    PADRE ISLAND NORTH              20000    2200           18820 2 1     500   22900    8500  30
   TX07 TEXAS MATAGORDA  BROWN CEDAR                                              1500 2 0      50             1450   4
   TX08 TEXAS MATAGORDA  MATAGORDA PENINSULA EAST                                11300 2 0     200            11100  18
   TX09 TEXAS MATAGORDA  MATAGORDA PENINSULA WEST         2550     100           16650 1 0     400    2000   16300  29
   TX12 TEXAS NUECES     MUSTANG ISLAND                    500    3500     500    8500 2 1    1000    4900    4500  18

   FEDMGT=  22600  ST MGT=  59700  OTHMGT=   1000  PRVMGT= 214200  #1ACRS=  32850  #2ACRS= 188700  #3ACRS= 260450  R-MILS=   361

   VA01 VA    ACCOMACK   ASSATEAGUE SOUTH                 1200                         2 0     100    2100           16
   VA03 VA    ACCOMACK   ASSAWOMAN ISLAND                                         3200 1 0            3200            3
   VA05 VA    ACCOMACK   CEDAR ISLAND                                             4300 2 0      50             4250   6
   VA04 VA    ACCOMACK   METOMPKIN ISLAND                                         3600 1 0                     3600   7
   VA06 VA    ACCOMACK   PARRAMORE ISLAND                                         3600 1 0            3600            8
   VA02 VA    ACCOMACK   WALLOPS ISLAND                   6000                         2 0     600    5400            6
   VA08 VA    NORTHAMPT. COBB ISLAND                                              3100 2 0                     3100   7
   VA10 VA    NORTHAMPT. FISHERMANS ISLAND                 450           10        460 1 1             440     860   2
   VA07 VA    NORTHAMPT. MOG ISLAND                                               5500 2 0                     5500   8
   VA09 VA    NORTHAMPT. SMITH ISLAND GROUP                       1600           17900 2 1     100    1400   17700  15
   VA11 VA    V.BEACHCITY FALSE CAPE                      3600                    4600 2 1     500    3800    4100  13

   FEDMGT=  17350  ST MGT=   1600  OTHMGT=     10  PRVMGT=  60160  #1ACRS=   1350  #2ACRS=  20040  #3ACRS=  30800  R-MILS=    83


   THE COLUMNS PRINTED ABOVE ARE LEFT TO RIGHT:
   FORM#,STNAME,CNTYNM,ISL NM,FEDMGT,ST MGT,OTHMGT,PRVMGT,& CODE,URBLOC,#1ACRS,#2ACRS,#3ACRS,R-MILS.
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APPENDIX G

BIBLIOGRAPHY OF BARRIER ISLAND SOURCES

Broadhead, J. M., and P. Godfrey. 1977. Off road vehicle impact in Cape Cod National Seashore: disruption and recovery of dune vegetation. International Journal of Biometeorology 21(3): 299-306.

Clark, John, ed. 1976. Barrier islands and beaches: technical proceedings of the 1976 barrier island workshop, Annapolis, Maryland, May 17-18, 1976.

Clark, John. 1974. Coastal ecosystems: ecological considerations for management of the coastal zone. The Conservation Foundation Washington, D.C.

Clark, J. 1976. The Sanibel report: formulation of a comprehensive plan based on natural systems. The Conservation Foundation.

Connors, D. L. A private approach to conservation: Tuckernuck Island, Massachusetts. Unpublished. Tyler and Reynolds and Craig, One Boston Place, Boston, Massachusetts 02108.

Connors, D. L. A regional approach to regulation of land use and development. Unpublished. Tyler and Reynolds and Craig, One Boston Place, Boston, Massachusetts 02108.

Cooke, C. W. 1968. Barrier island formation: discussion. Geological Society of America Bulletin 79(7) and (10): 945-46.

Culter, R. M., et al. 1976. The Virginia coast reserve study. The Nature Conservancy, Arlington, Virginia.

Dolan, R., and B. Hayden. 1974. Adjusting to nature in our national seashores. National Parks and Conservation Magazine 48(6): 9-14.

Dolan, R. and P. Godfrey. 1973. Effects of Hurricane Ginger on the barrier islands of North Carolina. Geological Society of America Bulletin 84(4): 1329-1333.

Dolan, R. 1965. Seasonal variations in beach profiles along the Outer Banks of North Carolina. Shore and Beach 33(2): 22-26.

Ducsik, D. W. 1973. Coastal zone utilization. Pages 12-1 to 12-141 in S. B. Saila, ed. Coastal and offshore environmental inventory: Cape Hatteras to Nantucket Shoals, complement volume. University of Rhode Island, Marine Publication Series No. 3.

Ducsik, D. W. 1974. Shoreline for the Public: a handbook of social and legal considerations regarding public recreational use of the nation's coastal shoreline. MIT Press, Boston.

Fisher, J. J. 1968. Barrier island formation: discussion. Geological Society of America Bulletin 79: 1421-1425.

Florida Department of Environmental Regulation. 1977. The Florida coastal management program workshop draft.

Gaskin, P., and J. R. Stottlemyer. 1974. Ecological and economic principles in park planning: the Assateague National Seashore model. Coastal Zone Management Journal 1(4): 395.

Godfrey, P. J. 1976. Barrier beaches of the East Coast. Oceanus 19(5): 27-40.

Godfrey P., and M. Godfrey. 1976. Barrier island ecology of Cape Lookout National Seashore and vicinity, North Carolina. NPS Scientific Monograph Series No. 9.

Godfrey, P. 1977. Climate, plant response and development of dunes on barrier beaches along the U.S. East Coast. International Journal of Biometeorology 21(3): 203-215.

Godfrey, P. 1978. Management guidelines for parks on barrier beaches. Parks 2(4).

Hoyt, J. H. 1970. Development and migration of barrier islands, northern Gulf of Mexico: discussion. Geological Society of America Bulletin 81: 3779-3782.

Hoyt, J. H., and V. J. Henry, Jr. 1967. Influence of island migration on barrier island sedimentation. Bulletin of the Geological Society of America 78(1): 77-86.

Kneeland, C. September 11, 1977. Islands for our future. Corpus Cristi Caller, Section B.

Kraft, J. C., et al. 1976. Delaware's changing shoreline. Delaware Coastal Zone Management Program Technical Report No. 1.

Manley, S., and R. Manley. 1968. Beaches: their lives, legends, and lore. Chilton Book Co., Philadelphia.

McGowen, J. H., et al. 1970. Effects of Hurricane Celia - a focus on environmental geologic problems of the Texas coastal zone. Texas University, Austin Bureau of Economic Geology, Geological Circular 70-3.

McHarg, I. L. 1969. Design with nature. Doubleday/Natural History Press, Garden City, N.Y.

Miller, H. C. 1977. Coastal flood hazards and the national flood insurance program. Department of Housing and Urban Development, Washington, D.C.

National Park Service. 1955. A report on the seashore recreation area survey of the Atlantic and Gulf Coasts. Washington, D.C.

National Park Service. 1962. Seashore preservation and recreation opportunities and storm damage. Washington, D.C.

Odum, E. P. 1961. The role of tidal marshes in estuarine production. The New York State Conservationist, June-July, 1961, Albany, N.Y.

Olsen, S. B. and M. J. Grant. 1973. Rhode Island's barrier beaches: Volume I, a report on a management problem and an evaluation of options. Coastal Management Publication, University of Rhode Island.

Pilkey, O. H., and D. M. Richter. 1965. Beach profiles of a Georgia barrier island. Southeastern Geology 6(1): 11-19.

Pilkey, O. H., et al. 1975. How to live with an island: a handbook to Bogue Banks, N.C. N.C. Department of Natural and Economic Resources.

Price, W. A. 1971. Environmental impact of Padre Isles development. Shore and Beach 39(2): 4-10.

Schwartz, M. L., ed. 1973. Barrier Islands. Stroudsburg, Pennsylvania.

Shows, E. W. Florida's coastal setback line: an effort to regulate beachfront development. Florida Department of Natural Resources.

Slaughter, T. H. 1973. Regulatory aspects relative to coastal management problems: Ocean City, Maryland's Atlantic coast beach. Shore and Beach 41(2): 5-11.

Spagna, N. J. 1977. A case history of Marco Island, Florida. Unpublished. Community Development Administrator, Collier County, Florida.

Sterling, D. 1967. The outer lands: a natural history guide to Cape Cod, Martha's Vineyard, Nantucket, Block Island, and Long Island. The Natural History Press, Garden City, N.Y.

Texas Coastal and Marine Council. 1977. Pictorial atlas of Texas coastal hazards.

Warner, L., and D. Strauss. 1976. Inventory of the status of the barrier islands of the southeast. Open Space Institute, Washington, D.C.

Wamke, D. A. 1966. Drastic beach changes in a low-energy-environment caused by Hurricane Betsy. Journal of Geophysical Research 71(6): 2013-2016.

White, G., and J. E. Haas. 1975. Assessment of research on natural hazards. MIT Press, Cambridge.

U.S. Army Corps of Engineers. 1973 The national shoreline study. U.S. Government Printing Office, Washington, D.C.

U.S. Department of the Interior, FWS. 1970. National estuary study, U.S. Government Printing Office, Washington, D.C.

Yonge, C. M. 1950. Life on sandy beaches. Science Progress 38(151): 430-443.

Ziegler, J. M. 1959. Origin of the sea islands of the southeastern United States. Geographical Review 49: 222-237.

Speech by Robert L. Herbst, Assistant Secretary for Fish and Wildlife and Parks, Department of the Interior, Before the Barrier Islands Conference

About 20 years ago, when I was first being asked to speak to groups like this as a natural outgrowth of my conservation jobs, I went back to the University of Minnesota School of Forestry where I was trained and sought out a wise professor who had often counseled me with certain insight and special wisdom.

We talked for a moment about old times and then I asked him what advice he had for me on public speaking. Then I waited for his profound words.

He said, "Bob, never accept an invitation to speak before noon. People just don't seem to hear as well first thing in the morning, some of them in fact have trouble seeing you. Second, he said, "If you must speak before noon, never deliver a keynote address...Let someone else warm them up first."

"Third", he said, "if you slip and do accept an early morning speaking engagement, for Christ sake, don't talk long. If, for example, they give you forty-five minutes on the program, either they are just trying to make you feel important, or...more likely, they couldn't get the second speaker they wanted, or it's the one for two concept like our hiring policy."

Then he said, "At the very least, if you must speak earlier and longer than you should, don't tell any jokes." So, this morning -- as your keynote speaker at nine in the morning with 45 minutes on the program -- I am going to follow his advice. I am not going to tell any jokes. My professor would want me to be serious, would want me to be as serious as you are about protecting our barrier islands. I could not help but think of a scientist, a strong voice for the sea as I looked out my window this morning.

No American in our lifetimes did more during her life to focus public interest on the sea, on nature, on man's harmful acts than the late Rachel Carson. In the introduction to The Silent Spring, she quoted Dr. Albert Schweitzer...his words being so apt for her subject -- a description of man's tunnel vision -- of modern man's blundering forward beyond progress to disaster.

I quote them this morning because they seem even more appropriate for us to consider, for us to accept as a real challenge. Schweitzer said, "Man has lost the capacity to foresee and forestall. He will end by destroying the Earth."

Our challenge is to prove Albert Schweitzer wrong. I think we can do it! This conference, and your concern for the Barrier Islands, is a small sign, at least, that you have foreseen and that you -- singly and together -- are trying to forestall the destruction of a very special part of this Earth.

Remarks by the Honorable Robert L. Herbst, Assistant Secretary for Fish and Wildlife and Parks, Department of the Interior, before Barrier Islands Conference, Provincetown, Massachusetts, May 27-29, 1980.

This conference -- and your concern for the Coast and barrier islands -- is a sign, if you will, that a few voices crying in the wilderness can turn the tide. Indifference to the irreplaceable parts of nature's mosaic is not acceptable. Destruction is not inevitable, if we will but use our God-given talents for anticipating and acting...of foreseeing and forestalling.

If concern for the barrier islands has been sporadic and less than a transcendent national concern in the past, that concern has grown...is more steady than before...and has hope of success, having enlisted as its articulate spokesmen, people like you, many who have professional commitments to conservation...and also a far wider group of people whose consciousness was raised during the Environmental Decade of the Seventies.

This decade -- beginning as it does with this "year of the Coast" holds out hope for infinitely better stewardship of the coast itself and the barrier islands. We have the components for success. We have a professional and scientific community alert and at work. We have traditional conservation leaders and groups concerned as never before. We have wider public, voluntary interest. We have government -- on local, state, and Federal level -- more than ever concerned with conservation in its complexity than in development in its simplicity. We are getting the kind of combined leadership we had too rarely before.

As you well know, in his 1979 Message of the Environment, President Carter said, and I quote, "America's coastlines are extraordinarily varied, productive, and beautiful. The coastal zone is subject to unusual pressures, both from natural causes and human activities. The opportunity for our citizens to enjoy beaches, bays, and marshes is often threatened. Working through the States, the goals of my policy will include protection of significant natural resources such as wetlands, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife."

We in Interior -- we in Fish and Wildlife and Parks -- are carrying out that assignment. (Let no one doubt our commitment.) It is so strong that it will survive the social and natural myopia of those who see barrier islands only as vacant land to be developed, to be filled at whatever cost. It will survive the inevitable austerity pressures of difficult economic conditions.

Our commitment will survive...and indeed prosper...because it is right... because it is sensible...because to do less is to permit greed and ignorance --- the children of darkness --- to prevail.

Why, some may ask, the intensity and emotion of this commitment? Why does your heart rage for these spits of sand, for these few acres of shifting land? I took my stand long ago, and had my views reprinted in our Department publication on the Barrier Islands because I wanted to be on record clearly, concisely, and permanently.

I said, "Barrier islands are different, they contain fascinating ecosystems not found anywhere else. Because of their inherent beauty, they are places of great attraction, offering not just scenic land and water scapes, but also the mystery and an allure that seacoasts always have had.

"We see today a pervasive disregard of the barrier islands' nature, of what ought to be their proper role. The balances are fragile, but the forces at work are not.

"It is clear that we cannot continue todevelop barrier islands as if they were mainland sites. Sooner or later we have to pay for our mistakes."

I believe that more strongly today than when I first said it. I believe that not only are we going to pay for mistakes, we ARE paying, and it's costly. I believe that you and I and this society, this affluent society even in times of economic trouble, have a responsibility that cannot be avoided, that cannot be halfhearted, to protect these precious bits of our universe.

And they need protection only because man will not leave well enough alone. Listen to what even FEMA -- the Federal Emergency Management Agency -- which is rarely confused with a conservation bias has said: "Without human structures there are no barrier island problems. The erosion, accretion, migration, overwash, and inlet formation that occur on barrier islands are natural processes that can co-exist in a state of equilibrium. It is only when structures are placed on barrier islands by man that these natural processes and the equilibrium are threatened and problems develop."

Knowing that, it is mystifying that we nevertheless continue to encourage development. A Library of Congress study puts the issue clearly: "If developed barrier islands have large potential public costs, undeveloped barrier have significant public benefits. These systems help protect shorefront areas from the full force of ocean storms. They absorb the energy of the waves and may reduce flooding. During calmer periods, barrier islands and beaches protect wetlands and estuaries from the direct influence of the ocean. Estuaries, where fresh and salt water mix, are among the most productive ecosystems in the world. They produce large populations of commerically valuable shellfish, crabs, and finfish; and birdlife abounds in satisfaction."

In short, barrier islands have qualities unequalled and virtually unparalleled. They are unique in their animal and plant life, providing a favorable habitat not only for fish and shellfish, but for reptiles, birds and mammals.

They provide protection for our mainland, and recreational activities of a special sort for millions and millions of people whose souls are refreshed and whose spirits soar like the osprey who nest and feed nearby. The figures by the way are astounding. About 25 million people visit the 10 National Park Service administered barrier islands annually, and millions more visit our wildlife refuges. We must remember that one of four -- let me put it another way -- 25 percent of our population lives within 100 miles of our East and Gulf coast barrier islands.

Yet as many of you know, while interest in the barrier islands has been great for some scientists and conservationists for years, it was not until recently that it was articulated as a national concern when President Carter called for a national study and policy relating to the barrier islands.

He spoke then of 189 coastal barrier islands of which 68 were unspoiled and he spoke movingly of the need to protect this special, irraplaceable national treasure of natural resources.

Subsequently, at his direction, we have studied a total of 295 units -- which were part, all, or a group of the islands -- totalling 1.6 million acres. Compared to the entire continental United States which contain over 2 billion acres, they may not be a large amount. But, as I have said, they perform unique functions. They protect a thousand miles of our coast from storms and the frenzied power of the sea. Think, if you will, what the consequence might be without them, think of the power unleashed on those millions who live so close to them on the protected mainland. It is quite unbelievable that we should as a Nation remain casual or indifferent to their proper survival.

Yet we seem so. We ignore or shrug off the sand castles of developers, hardly more permanent than a child's play buildings at the edge of the sea. We must in this year of the coast recognize the many dangers of the continued existence of these islands. Few of those dangers are natural -- almost all are manmade as FEMA pointed out. Of those dangers, most come from acts of development made without apparent thought to consequence, or worse still, from a callous indifference to the inevitable changes. Those islands are tolerant of the great power of wind and water; they can absorb everything from gentle shifting of sand to the untold devastation of great hurricanes.

What they cannot tolerate is wood and concrete plopped where they should never be. We can foresee the consequences;yet we build on dunes which left alone replenish themselves. And then we see them destroyed. And then we build again, so close to the sea as to challenge nature. When the inevitable destruction comes once again, the remanents of our works -- half structures of wood and metal in bits and pieces -- stand mute like scarecrows in a field that has been ravaged by birds or weather. We are as wise as those scarecrows, monuments to empty bravado.

I say to you that it is presumptuous -- no maybe just ignorant -- to handle nature this way. I understand that much of the real estate development grows out of the legitimate human urge to savor the sights, sounds and joys of the sea and the shore. But to purchase those temporary, transitory pleasures for a few today at the inevitable expense of future generations is scandalous.

Left alone our barrier islands are a precious resource which feed us and protect us and entertain us and lift our spirits in an almost primeval way. But we do not leave it alone.

How long does it take to learn? The coastal zone along our continent has enough problems of development as it is without our mindless scrambling to find even more problems for the islands themselves. We seem unable even now to define a protective system for our coasts. We watch even now in the Year of the Coast as they are threatened by refinery and power plant sitings, by ports for even larger tankers. We fill up marsh land, pollute estuaries, destroy the grasses and life of the coast as though these things were the only protein on which to build the sinews of industry. Certainly it is short-sighted. For sure it is not visionary.

I sometimes hesitate to criticise our private economic policies even when they seem confused since our Federal government policy which should be more amenable to some rational order is just as confused...maybe more.

There are at least 20 Federal agencies which administer about 30 programs which affect the barrier islands and half of those programs are pro-development, and about a quarter of them protection-oriented. Of course isn't that our general National Policy on whatever the issue? Man giveth and man taketh away.

We spend endless millions of dollars to encourage development while we spend other millions to encourage the protection of the islands. When nature proves us fools by blowing away what we have built, we start all over again because we have federally insured what was bound to be destroyed, and then spend some more millions and maybe even several times more.

If lemmings could write insurance, not one would be unemployed. Our policy is like writing insurance on a building that is already on fire. We are bound to lose, yet we persist.

Our barrier island economic policy is part compulsion to build and part local boosterism, I suppose. It is the creature of economic development laws and small business loans and disaster insurance and emergency compassion -- all of which make sense -- except on the barrier islands where it is built on a foundation of shifting sand.

Our present policy which encourages a cycle of build, destruction, and build reminds me of the late Senator Everett Dirksen who once mused, "A million here...a million there...pretty soon it adds up to real money."

And so, in this Year of the Coast we would all do the Republic a favor if we could convey widely the idea that the best economy is to spend to protect the islands. It is both the most liberal and the most conservative approach in this - a political year.

We still have the chance to protect much of the barrier islands. If it costs too much to buy them all -- and it does -- there are still things that can be done, or at least started in what remains in this year of the coast.

First, while much is known about the barrier islands and how they react to various forces, we need a coordinated, system-oriented research program to determine even more precisely how the islands function so that we can better predict how they will react to future forces.

We need to move to protect the undeveloped and as yet unprotected islands. We need to improve the level of protections of lands which are already under public control..That will take further coordination and consultation between Federal, State and local governments. Plus some firm controversial decisions, but they must be made.

Where there are already developed islands, where it is appropriate, we must move to restrain or channel development from free form growth into development which is compatible with permitting the islands to live on, ever changing, but in a sense ever permanent.

We must do this together. We have not lost our ability to foresee. We have not lost our ability to forestall. Despite that, however, it remains unresolved whether we will in the end destroy the earth...starting with our barrier islands. We don't have to let it happen. Bob McIntosh will outline in detail our proposed Policy alternatives this afternoon.

May we go from this place preaching a doctrine that will help save our Nation's soul -- that the barrier islands belong to all and forever, and do what we can individually and collectively to see that our words become deeds, otherwise the words of Albert Schweitzer will be fact.

Senator Bumpers. Our next panel consists of Mr. Michael Glazer, Assistant Administrator, Coastal Zone Management; Ms. Gloria Jimenez, Federal Insurance Administrator; Dr. Neil Frank, International Hurricane Center.

Why don't we get started with you, Ms. Jimenez, and let me again reiterate that we are under severe time constraints this morning.

STATEMENT OF HON. GLORIA M. JIMENEZ, FEDERAL INSURANCE ADMINISTRATOR, ASSOCIATE DIRECTOR OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY

Ms. Jimenez. Good morning. I am Gloria Jimenez, Federal Insurance Administrator, Associate Director of the Federal Emergency Management Agency.

Senator Bumpers. Please pull the microphone as close to you as you can get it.

Ms. Jimenez. I am pleased to have the opportunity to address you on the issue of barrier island protection.

While the national flood insurance program does not have the authority to completely restrict growth on environmentally sensitive and hazardous barrier islands, it has been able to foster the adoption of land use control measures by most coastal communities.

The national flood insurance program was enacted in 1968 with a major amendment in 1973. It has two objectives—to make flood insurance available for existing structures in flood prone areas, but more importantly, to require that participating communities carefully regulate the location and construction of new buildings so as to minimize future flood losses.

A participating community must satisfy the minimum program flood plain management requirements. Once it has done so, subsidized flood insurance is available for all existing construction throughout the community.

It is important to note that the statute does not give us authority to restrict availability of insurance. If a community qualifies for the program, property throughout the community is eligible for insurance. FIA then conducts a detailed study of the nature and extent of the community's flood hazard areas, and when the 100-year flood elevations developed by the study become effective, new construction is only eligible to be insured at unsubsidized, actuarial rates.

There has been some question as to whether the availability of flood insurance has encouraged development in these areas which might otherwise not have taken place. Whatever independent studies have been done have shown that flood insurance has played a small role in this development.

Because the national flood insurance program, provides at least a small part of the total Federal subsidy, I am determined to take every step possible under the authority of the legislation to assure that the congressional intent of directing development out of hazardous areas and the mitigation of future damages is accomplished, and that this Federal subsidy is used as a leverage to promote safer and more prudent settlement patterns.

One of FIA's major accomplishments in the seventies was the study and mapping of most of the Nation's flood hazard areas. However, in mapping these areas, it has been our policy to use the best methodologies available, and one of the problems in mapping coastal zone areas was that coastal surge modeling for determining base flood elevations was in its infancy when the program began. Because this methodology did not include the wave height factor which affects areas threatened by hurricanes and northeasterns, the studies and maps done at that time do not reflect the wave height associated with storm surge, and therefore do not reflect the true hundred year standard.

It was only in 1978 that a uniformly and generally acceptable approach was available for estimating the 100 year crest elevation. The Federal Insurance Administration had presented the problems to the National Academy of Sciences for resolution, and the Academy developed a technically and scientifically acceptable methodology to depict the wave height which could be incorporated into the existing surge methodology.

The maximum increases in base flood elevations which will result from the application of this methodology will be about 50 percent on the open shore. This will generally mean an increase of 3 to 8 feet in coastal community elevations.

I am submitting for the record the FIA paper, "The National Flood Insurance Program's Treatment of Coastal Wave Heights" which discusses this matter in greater depth.

The first revised maps of wave height have been published for Alabama coastal communities, because we were concerned that the communities there were about to redevelop without benefit of knowledge of the true hazard that existed there.

I must point out that this action of including wave height is extremely controversial and is generating opposition from some communities which find even the present still water elevations much too restrictive.

As a means of discouraging unwise construction in the most hazardous coastal areas, FIA will be implementing new rating procedures for all new constructions in coastal zones. The present procedure utilizes fixed rate actuarial tables which are applied by any licensed agent or broker. Under the new procedures, FIA will establish the flood insurance risk premium rate for new construction in coastal zones on an individual case-by-case basis after an inspection of the plans and property. The determination of rating will incorporate a number of factors such as wave height, type and quality of pilings, depth of anchoring and elevation of the structure itself. By inspecting proposed construction itself, we will help to assure that the coastal construction is built in recognition of the hazard and will assure that the Government receives an accurate premium for the flood risk.

FIA will shortly release a coastal construction manual to improve construction techniques in coastal communities. This manual will provide advice on improved footings for piles, and for additional bracing of piles. It also will enable communities to adopt construction standards to meet the additional elevation requirements.

Additionally, I am strengthening our regulations on enclosing the area below base flood elevation in velocity zones to prohibit

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any type of solid breakaway wall. Senator Schwartz pointed out the problems we experience when people enclose the lower areas. The new regulation will permit only enclosures with open wood lattices and will continue the prohibition against using this area for living purposes.

Those enclosed areas will enjoy prohibitive rates. Prohibition against alteration of sand dunes will be similarly strengthened.

To provide a perspective of this issue, I would like to pass along a few key statistics. Barrier islands normally contain coastal high hazard areas which are indicated on the Federal Insurance Administration maps as V zones. The "V" stands for velocity, and these zones indicate areas where velocity wave action will occur during the 100-year flood. However, there may be extensive areas on barrier islands which are outside these zones and in fact may not even be flood prone.

FIA has about 4,300 structures rated as new construction, and about 52,000 rated as existing construction in V zones. There are 1.8 million policies in effect in all zones nationwide.

New structures and their contents in V zones are insured for about $94,000 on the average, while the average existing structure is covered by only $60,000. The average claims payment for flood damage to new construction of V zones, including content loss, was $16,300, while the same figure for existing construction of V zones was $10,000. By comparison, the average claims payment programwide is a little over $6,000. There is $3.5 billion worth of flood insurance in V zones, and $75 billion nationwide.

Recent data indicates that the program's loss ratios, the actual dollars paid to the insured for losses as compared to dollars received as premiums, are much too high for new structures built in V zones with elevations, as well as for structures in "B" and "C" zones those areas outside the special flood hazard areas. I would like to submit that data for the record. We are in the process of a rate review, and we expect to implement the rate increase by January 1981.

President Carter shares your concern about unwise development of flood plains and coastal high hazard areas. On May 24, 1977, he issued Executive Order 11988, which when fully implemented will have far-reaching implications for all flood prone areas, including barrier islands.

Some of the immediate effects of the Executive Order 11988 are that the Small Business Administration which previously only lent money to rebuild in place will now lend money only for relocation if your structure is substantially damaged. NOAA's Coastal Zone Management office turned down a request for financial assistance to rebuilt and extend sewer lines in Gulf Shores. Instead, they have agreed to fund a system that would serve only existing development.

The Environmental Protection Agency is involved in similar negotiations in Cape May, N.J., and for our part, FIA is using insurance claims proceeds to relocate structures subject to repeated flooding with funds from other Federal agencies to supplement the claim payment.

FEMA's Office of Disaster Response and Recovery carefully evaluates all requests for disaster assistance in accordance with the

Executive order, turning down or redirecting requests that will not reduce future vulnerability, rather than simply returning communities to predisaster status quo.

In closing, I offer this caveat to a prohibition against insurance availability. Our enabling statute was written with the assumption that flood insurance would be available throughout a participating community. If insurance becomes unavailable, communities may elect not to participate. In that case, while on the one hand insurance would be unavailable to support development, on the other hand, the flood plain management measures previously adopted by the participating community would no longer be enforced in coastal areas. Thus whatever hazard mitigation measures previously in force might be lost. We must be careful, therefore, lest in attempting to make more progress for legitimate hazard mitigation objectives we let slip those gains which we have already made.

[The prepared statement of Ms. Jimenez follows:]

TESTIMONY OF GLORIA M. JIMENEZ
BEFORE THE
SUBCOMMITTEE ON PARKS, RECREATION, AND RENEWABLE RESOURCES
OF THE SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
JUNE 12, 1980

MR. CHAIRMAN, I AM PLEASED TO HAVE THE OPPORTUNITY TO ADDRESS YOU ON THE ISSUE OF BARRIER ISLAND PROTECTION. THE NATIONAL FLOOD INSURANCE PROGRAM HOLDS THE POTENTIAL FOR HAVING A SIGNIFICANT IMPACT ON BARRIER ISLANDS, AND I HAVE TAKEN SOME STEPS WHICH CAN NOT ONLY MINIMIZE ANY ADVERSE EFFECTS OF THE PROGRAM ON COASTAL AREAS, INCLUDING BARRIER ISLANDS, BUT PROVIDE POSITIVE, CONSTRUCTIVE GUIDANCE TO DEVELOPMENT ACTIVITIES TAKING PLACE THERE.

WHILE THE PROGRAM DOES NOT HAVE THE AUTHORITY TO COMPLETELY RESTRICT GROWTH ON ENVIRONMENTALLY SENSITIVE AND HAZARDOUS BARRIER ISLANDS, IT HAS BEEN ABLE TO FOSTER THE ADOPTION OF LAND USE CONTROL MEASURES BY MOST COASTAL COMMUNITIES.

THIS MORNING I WOULD LIKE TO BRIEFLY DESCRIBE THE NATIONAL FLOOD INSURANCE PROGRAM, DEMONSTRATE THE IMPACT THE PROGRAM HAS HAD ON COASTAL AREAS, AND DISCUSS RECENT PROGRAM INITIATIVES IN THOSE AREAS.

THE NATIONAL FLOOD INSURANCE PROGRAM WAS ENACTED IN 1968, WITH A MAJOR AMENDMENT IN 1973. THE PROGRAM HAS TWO OBJECTIVES--TO MAKE FLOOD INSURANCE AVAILABLE FOR EXISTING STRUCTURES IN FLOOD-PRONE AREAS AND MORE IMPORTANTLY TO REQUIRE THAT PARTICIPATING COMMUNITIES CAREFULLY REGULATE THE LOCATION AND CONSTRUCTION OF NEW BUILDINGS SO AS TO MINIMIZE FUTURE FLOOD LOSSES. A PARTICIPATING COMMUNITY MUST SATISFY THE MINIMUM PROGRAM FLOOD PLAIN MANAGEMENT REQUIREMENTS, AND ONCE IT HAS DONE SO, SUBSIDIZED FLOOD INSURANCE IS AVAILABLE FOR ALL EXISTING CONSTRUCTION THROUGHOUT THE COMMUNITY. IT IS IMPORTANT TO NOTE THAT THE STATUTE DOES NOT GIVE US AUTHORITY TO RESTRICT AVAILABILITY OF INSURANCE.

If a community qualifies for the Program, property throughout the community is eligible for insurance. FIA then conducts a detailed study of the nature and extent of the community's flood hazard areas and when the 100-year flood elevations developed by the study become effective, new construction is only eligible to be insured at unsubsidized, actuarial rates.

There has been some question as to whether the availability of flood insurance has encouraged development in these areas which might otherwise not have taken place. However, whatever independent studies have been done have shown that flood insurance has played a small role in this development.

Human settlements have historically gravitated towards coastal areas. With or without Federal assistance, development has occurred and absent other controls, will continue to occur in coastal areas and barrier islands--witness Miami Beach. However, there is no doubt that the Federal government, through a number of its programs, has facilitated such development. Federal funding of access to barrier islands, bridges, highways, water and sewer systems, airports, schools and hospitals and Federal disaster assistance to rebuild and restore after a storm has damaged them, have enabled coastal communities to grow despite the serious hazards which continue to threaten them.

Because the National Flood Insurance Program provides at least a small part of the total Federal subsidy, I am determined to take every step possible under the authority of the legislation to assure that the Congressional intent of directing development out of hazardous areas and the mitigation of future damages is accomplished, and that this Federal subsidy is used as a leverage to promote safer and more prudent settlement patterns.

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One of FIA's major accomplishments in the 1970's was the study and mapping of most of the nation's flood hazard areas. However, in mapping these areas, it has been our policy to use the best methodologies available, and one of the problems in mapping coastal areas was that Coastal surge modeling for determining base flood elevations was in its infancy when the Program began. Because this methodology did not include the wave height factor which affects areas threatened by hurricanes and northeasterns, the studies and maps done at that time do not reflect the wave effect associated with storm surge, and therefore do not reflect the true 100 year standards.

It was only in 1978, that a uniformly and generally acceptable approach was available for estimating the 100 year crest elevation. The Federal Insurance Administration had presented its problem to the National Academy of Sciences for resolution, and the Academy developed a technically and scientifically acceptable methodology to depict the wave height effect which could be incorporated into the existing surge methodology.

The maximum increases in base flood elevations which will result from the application of this methodology will be about 50% on the open shore. This will generally mean an increase of three to eight feet in coastal communities' base flood elevations for areas at the normal shoreline. As the wave diminishes further inland, the effect of the addition of wave heights will be negligible and elevations will return to still water levels. Thus, the size of the special flood hazard area will generally not be changed by the wave height analysis in most areas; only the elevations within the flood plain will change.

I would like to submit for the record an FIA paper, "The National Flood Insurance Program's Treatment of Coastal Wave Heights," which discusses this matter in greater depth.

The first revised maps with wave heights have been published for Alabama coastal communities, and we have begun to amend other maps for the remaining coastal communities. While I believe the incorporation of these wave heights will serve as a disincentive for new construction, I must point out that this action is extremely controversial, and is generating opposition from some communities which find even the present still water elevations too restrictive.

As a means of discouraging unwise construction in the most hazardous coastal areas, FIA will be implementing new rating procedures for all new construction in coastal zones. The present procedure utilizes fixed-rate actuarial tables which are applied by any licensed insurance agent or broker. Under the new procedures, FIA will establish the flood insurance risk premium rate for new construction in coastal zones on an individual case-by-case basis after an inspection of the property. The determination of rating will incorporate a number of factors such as wave heights, the type and quality of pilings, the depth of anchoring, and the elevation of the structure itself. By inspecting the proposed construction itself, we will help to assure that coastal construction is built in recognition of the hazard and will assure that the Government receives an accurate premium for the flood risk. This direct link between FIA and the private building sector will encourage safe building practices and will, undoubtedly, result in a considerable savings of lives, property, and costly disaster relief assistance.

Our major coastal restriction on building is the elevation of structures, but while the regulations require that structures be elevated, they provide no guidance as to how to properly elevate and anchor structures. The damage inflicted by Hurricane Frederic on the Alabama coast showed how necessary it is to provide more guidance and assistance on coastal construction techniques.

In order to do this, the Federal Insurance Administration will shortly release a Coastal Construction Manual to improve the construction techniques in coastal communities. This manual will provide advice on improved footings for piles and for additional bracing of piles. It will also enable communities to adopt construction standards to meet the additional elevation requirements.

Additionally, I am tightening our regulations on enclosing the area below base flood elevation in velocity zones to prohibit any type of solid breakaway wall. The new regulation will permit only enclosures with open wood lattices and will continue the prohibition against using this area for living purposes.

The prohibition against the alteration of sand dunes will be similarly strenghtened.

To provide a perspective of this issue, I would like to pass along a few key statistics. Barrier islands normally contain coastal high hazard areas which are indicated on the Federal Insurance Administration's (FIA) maps as V-zones. The "V" stands for "Velocity" and these zones indicate areas where velocity wave action will occur during the 100-year flood. However, there may be extensive areas on barrier islands which are outside V zones and, in fact, may not be flood-prone.

FIA has about 4,300 structures rated as new construction and about 52,000 rated as existing construction in V zones. There are 1.8 million policies in effect in all zones nationwide.

New structures and their contents in V zones are insured for about $94,000 on the average, while the average existing structure is covered by only $60,511. The average claims payment for flood damaged new construction in V zones including contents loss was $16,325, while the same figure for existing construction in V zones was $10,123. By comparison, the average claim payment program-wide is a little over $6,000. There is $3.5 billion worth of flood insurance in V zones and $75 billion nationwide.

Recent data indicates that the Program's loss ratios—the actual dollars paid to the insured for losses as compared to the dollars received as premiums are much too high for new structures built in V zones with elevations, as well as for structures in "B" and "C" zones—those areas outside the special flood hazard areas. I would like to submit that data for the record.

President Carter shares your concern about unwise development in flood plains and coastal high hazard areas. On May 24, 1977, he issued Executive Order 11988, which when fully implemented will have far reaching implications for all flood prone areas including barrier islands.

Executive Order 11988 directs all federal agencies to carefully consider all of the alternatives before funding any projects in or affecting flood-prone areas, one of the alternatives always being not to fund the project at all. The Executive Order calls for public notice and hearing and, if, after going through this entire process, the decision is to fund the project, it must be built so as to mitigate the hazard to the greatest extent possible. This applies to all construction projects both pre and post disaster.

The Federal Insurance Administration flood maps are referenced in the Executive Order and FIA is named as one of the consulting agencies, along with the Water Resources Council and the White House Council on Environmental Quality.

One of the immediate results of President Carter's Executive Order is that the Small Business Administration now will lend money only for relocation if your home is substantially damaged. Previously, they would only lend money to rebuild in place.

Further, NOAA's Coastal Zone Management Office recently turned down a request for financial assistance to rebuild and extend sewer lines in Gulf Shores. Instead, they have agreed to fund a system that would serve only existing development.

The Environmental Protection Agency is involved in similar negotiations in Cape May, New Jersey.

For our part, the Federal Insurance Administration is using insurance claims proceeds to relocate structures subject to repeated flooding with funds from other Federal programs serving to supplement the claims payments.

FEMA's Office of Disaster Response and Recovery also carefully evaluates all requests for assistance in accordance with the Executive Order turning down or redirecting requests that will not reduce future vulnerability, rather than simply returning communities to the pre-disaster status quo.

In closing, I offer this caveat to a prohibition against insurance availability. Our enabling statute was written with the assumption that flood insurance would be available throughout a participating community. If insurance becomes unavailable, communities may elect to not participate. In that case, while on the one hand insurance would be unavailable to support development, on the other hand, the flood plain management measures previously adopted by the participating community would no longer be enforced in the coastal areas. Thus, whatever hazard mitigation measures previously in force might be lost. We must must be careful, therefore, lest in attempting to make more progress toward legitimate hazard mitigation objectives, we let slip those gains which we have already made.

Again, I thank you for this opportunity to testify.

The National Flood Insurance Program's
Treatment of Coastal Wave Heights

I. Background

Section 1360(a) of the 1968 National Flood Insurance Act (P.L. 90-448) requires the identification of special flood hazard areas. Congressional hearings prior to the 1973 Flood Disaster Protection Act (P.L. 93-234) and the actual wording of P.L. 93-383, Section 816(a) make it clear that Congress intended the National Flood Insurance Program (NFIP) to identify areas inundated by the 100-year "base" flood, more accurately described as a flood which has a 1% chance of being equalled or exceeded in any given year.

II. Mapping Flood Plain Areas Threatened by Storm Surge Flooding

In mapping special flood hazard areas, it has been the Federal Insurance Administration's policy to use the best methodologies available. Coastal surge modeling for determining base flood elevations was in its infancy when the Program began. Partially as a result of our extensive mapping effort, this methodology has been refined during the past few years. Different coastal methodologies are used in areas affected by hurricane flooding, northeasters, and tsunamis. Wave height associated with storm surge primarily affects areas threatened by hurricanes and northeasters; that is, the Atlantic and Gulf coast communities.

The storm surge methodology which has been used in the past to determine base flood elevations in hurricane and northeaster-prone areas does not reflect the full wave effect associated with the storm surge. Prior to 1978, no uniformly applicable and generally acceptable approach was available for estimating the 100-year wave crest elevations. FIA presented this problem to the National Academy of Sciences for resolution. As a result, the Academy developed a methodology to depict the wave height effect which could be incorporated in the existing surge methodology.

The maximum increases in base flood elevations, which will result from the application of this methodology, will be about 50% on the open shore. This will generally mean an increase of three to eight feet in coastal communities' base flood elevations for areas at the normal shoreline. As the wave diminishes further inland, the effect of the addition of wave heights will become negligible and elevations will return to stillwater levels. Thus, the size of the special flood hazard area will generally not be changed by the wave height analysis in most areas. Only the elevations within the flood plain will change.

III. FIA's Decision on the Treatment of Wave Heights

Since FIA is aware that coastal flood hazards have not been fully reflected on our maps, and a methodology for doing so is now available, it is incumbent on FIA to begin developing the more accurate risk information.

If FIA were to continue using the stillwater surge levels, it would knowingly create a false sense of security. Individuals elevating their houses to the stillwater flood elevation would not really be protected from the base flood. Three to eight feet of water in the form of breaking waves can do considerable damage. Using stillwater levels has also meant that the insurance rates for new contruction have not currently reflected the full hazard. For these reasons, FIA has decided to begin using the wave crest levels which more accurately reflect the hazard.

IV. Map Revisions

The first communities mapped using the new methodology were the Alabama Gulf coast communities struck by Hurricane Frederic. Many Gulf coast communities had been enforcing the base flood elevation requirement (without wave heights) for five or more years. The devastation wrought by Frederic has indicated that the stillwater protection standard was not adequate. This time of reconstruction is a tremendous opportunity to rebuild structures to safer elevations. The first maps with base flood elevations, which include the wave height, were issued on April 15, 1980 for the affected Gulf coast communities. There will be a statutory 90-day appeals period during which a community may present scientific or technical information refuting the revised elevations. Once any appeals are resolved, the maps will be made effective for flood plain management purposes six months later. The revised elevations must be formally adopted by the community at the end of this six month period if continued eligibility in the Program is desired.

Mandatory construction to the revised elevations will not be required until adopted by local ordinance. However, FIA will be encouraging voluntary elevation to the higher standards by pointing out the resulting decrease in the flood hazard and by factoring the wave height hazard into the insurance rating structure when maps are issued. Once the maps are available, agents will use the higher base flood elevation in rating structures. Later in 1980, agents will not be able to issue policies for new construction in V zones until the structural plans and adjacent ground elevation are submitted to FIA for an insurance rating evaluation. FIA will evaluate the information and, for construction exceeding a fixed dollar amount, will make an on-site inspection of the property. Based on this evaluation, a specific flood insurance rate will be assigned for that property, reflecting the hazard at the site and the construction techniques.

These changes will have no effect on the structures existing in these communities before the maps become available. Structures elevated to the current base flood elevation will continue to be eligible for a low premium, unless they are substantially improved. Structures build before base flood elevations were established will continue to be eligible for the subsidized rate, unless they are substantially improved.

Flood Insurance Rate Maps for all 1100 communities on the East and Gulf coast will be revised to include wave crest elevations in a phased program over the next three years. Communities currently under study, or where studies have been completed recently, will have maps revised first, beginning in Fiscal Year 1980. This amounts to about 400 study starts. In FY-81, we hope to initiate another 400 wave height studies for regular program communities depending on funding levels. Finally, in FY-82 any remaining wave height studies will be initiated.

V. Benefits of Elevating to the Wave Height

There will be an additional cost factor to people building new structures. For example, elevating a $60,000 rigid frame house an additional three feet will cost approximately $2,200. Elevating a $60,000 rigid frame house an additional seven feet will cost approximately $4,500. Comparing the benefits of reduced flood damages due to protection to the wave height, against the

the costs of additional construction to the higher elevation, results in very favorable benefit - costs ratios ranging from 8.2 to 1.0 depending on the difference between current and revised flood elevations and the type of construction. Benefits will be even more favorable when the reduced costs of flood insurance, by elevating to the wave height, is factored in.

An important benefit is that FIA will satisfy the Congressional mandate by accurately establishing the base flood elevation. Additionally, the current insurance rate system for coastal areas, which underestimates the true hazard, will be corrected. In many coastal areas, the majority of the residents are summer occupants of second homes. For example, on Dauphin Island, Alabama, approximately 60% of the residents are summer residents. These second home owners in particular should not be subsidized by American taxpayers, through insurance rates which are too low.

The major benefit is implied in the favorable benefit - cost ratios. The higher standard will help to avoid the economic devastion which normally is caused by a hurricane or northeaster. Elevation to the wave height will enable communities to survive much larger hurricanes and northeasters with little flood damage.

6/9/80

NATIONAL FLOOD INSURANCE PROGRAM
LOSS & EXPENSE EXPERIENCE
January 1, 1978 - April 23, 1980

	V Zones			Zones A1 - A30					
	Post FIRM Construction	Pre FIRM Construction	Unnumbered Zone A	Post FIRM Construction	Pre FIRM Construction	Zone B	Zone C	Emergency Program	Program Totals
1) Number of Policies - Current	4,314	52,087	100,070	46,021	476,243	153,621	281,730	661,914	1,794,816
2) Average Amount of Insurance-Current	$94,000	$60,511	$38,950	$70,304	$42,289	$51,244	$58,959	$30,008	$41,878
3) Average Premium - (1/1/78-4/23/80	$98.43	$113.93	$72.37	$71.34	$88.33	$50.10	$32.93	$85.60	$77.61
4) Number of Paid Claims - (1/1/78-4/23/80)	204	1,995	4,748	739	21,979	4,284	11,696	55,973	102,765
5) Average Claims Payment (1/1/78-4/23/80)	$16,325	$10,123	$7,190	$10,060	$6,984	$8,214	$7,750	$4,882	$6,098
6) Ratio (8) ÷ (3)	4.861	1.73	3.39	1.42	2.03	2.96	6.73	2.06	2.37
7) Average Claim Frequency per 100 policies - (1/1/78-4/23/80)	2.9	1.9	3.4	1.0	2.6	1.8	2.9	3.6	3.0
8) Average Loss Cost per Policy (1/1/78-4/23/80)	$478.48	$197.10	$245.43	$101.01	$179.39	$148.22	$221.55	$176.48	$183.62
9) Other Expenses (1/1/78 to 4/23/80 (avg. per policy)									
a) Insurance Agent	$19.69	$22.79	$14.47	$14.27	$17.67	$15.03	$13.17	$17.12	$16.66
b) Loss Adjuster	$20.37	$ 8.48	$10.55	$ 4.34	$ 7.71	$ 6.37	$ 9.53	$ 7.59	$ 7.90
c) Servicing Facility	$11.70	$11.70	$11.70	$11.70	$11.70	$11.70	$11.70	$11.70	$11.70
10) Average Operating Deficit per Policy									
a) Paid basis (above)	$432.01	$126.14	$209.78	$ 59.98	$128.14	$131.22	$223.02	$127.29	$142.27
b) Incurred basis **	$507.61	$157.28	$248.56	$ 75.94	$156.48	$154.64	$258.03	$155.17	$171.27

** Paid basis plus an estimate for pending claims. Amount of pending claims estimated by multiplying Line 8 by a factor of .158, derived from historical experience.

6/9/80

NATIONAL FLOOD INSURANCE PROGRAM
LOSS & EXPENSE EXPERIENCE
January 1, 1978 - April 23, 1980

	V Zones			Unnumbered	Zones A1 - A30					
	New Construction	Existing Construction	Totals	Zone A	New Construction	Existing Construction	Totals	Zone B	Zone C	Emergency Program
1) Number of Policies in Force - Current	4,314	52,087	56,401	180,070	46,201	476,243	522,444	153,621	281,730	661,914
2) Amount of Insurance - Current	$465,514,900	3,091,839,000	3,557,353,900	3,897,774,600	3,248,105,800	20,139,863,600	23,387,969,400	7,872,137,700	16,410,417,100	18,863,887,000
3) Insurance Premium Earned (1/1/78-4/23/80)	$685,067	11,673,540	12,358,607	10,066,919	5,605,427	75,582,313	81,187,740	11,884,386	13,473,897	132,544,832
4) Claims Payments (1/1/78-4/23/80)	$3,330,210	20,196,051	23,526,261	34,139,367	7,936,981	153,496,413	161,433,394	23,188,341	90,628,282	272,247,252
5) Number of Paid Claims	204	1,995	2,199	4,748	789	21,979	22,768	4,284	11,696	33,873
6) Loss Adjuster Expense	$143,199	868,430	1,011,629	1,467,993	341,290	6,600,354	6,941,644	1,522,107	3,087,446	11,749,622
7) Insurance Agents Commissions	$137,013	2,334,708	2,471,721	2,013,383	1,121,085	15,116,463	16,237,548	3,368,375	5,289,319	26,508,967
8) General Expenses	$81,432	1,198,805	1,280,237	1,627,517	919,351	10,011,257	10,930,608	2,777,897	4,786,622	18,114,656
9) Operating Deficit (excluding pending claims estimated to be about $99 million)	$3,006,787	12,924,454	15,931,241	29,182,361	4,713,280	109,642,374	114,355,654	31,152,136	91,238,363	387,875,673
10) Number of Policy Years of Exposure	6,960	102,462	109,422	139,106	78,577	855,663	934,240	237,410	689,113	1,546,284

Mr. Bumpers. Mr. Glazer.

STATEMENT OF MICHAEL P. GLAZER, ASSISTANT ADMINISTRATOR, COASTAL ZONE MANAGEMENT, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. Glazer. Thank you, Mr. Chairman.

Senator Bumpers. Can you summarize?

Mr. Glazer. I can. I am the Assistant Administrator for Coastal Zone Management, in the National Oceanic and Atmospheric Administration. I would like to submit my statement for the record and summarize briefly three programs that we run to help States do a better job in dealing with barrier island problems.

The first is the coastal zone management program. Assistant Secretary Herbst was correct in stating that 19 States are now in the program. By the end of this year, there should be 25 approved States covering about 82 percent of the Nation's shoreline.

We provide funds for a number of purposes related to barrier islands through the coastal zone management program. The funds we provide are used by States to develop and implement coastal management programs. Those programs place a substantial degree of emphasis on the protection of barrier islands. In addition, most States administer CZM permitting systems which take account of the value of coastal resources, including barrier islands. For example, in Massachusetts, the Wetlands Protection Act regulates development on barrier islands. Other States have similar permitting systems.

Second, many States have enacted special area protection laws which have a beneficial impact on barrier islands. Examples are beach and dune protection statutes in the North and South Carolina coastal programs.

Third, Federal approval of State CZM programs has resulted in more stringent State review of State and Federal infrastructure decisions. For instance, South Carolina's CZM program includes a policy to discourage new public investment in infrastructure such as roads on undeveloped barrier islands.

Finally, some CZM funds have been used for special projects concerning barrier islands. Delaware, for example, is using Federal funds to map barrier beaches and to establish setback lines on which new regulations for managing beaches and dunes will be based.

A second relevant program that is administered under the Coastal Zone Management Act is the coastal energy impact program. Nine States so far have used $1.5 million in CEIP funds to perform 28 separate planning studies which directly or indirectly involve barrier islands. Louisiana, for example, has used CEIP funds to investigate the extent of damages to coastal marshes caused by energy activities and to devise strategies to prevent barrier island erosion. Other States have used CEIP funds to construct facilities on or affecting barrier islands. Massachusetts has acquired oilspill cleanup facilities on one of its barrier islands. Texas has constructed beach improvements which are intended to attract people away from sensitive barrier island areas on to other less sensitive areas.

Third and finally, we administer the estuarine sanctuary program, which provides Federal matching funds to States to develop estuarine sanctuaries for research and education purposes. Four barrier islands are included in the seven sanctuaries established to date. The estuarine sanctuary program is unique because it provides for a Federal partnership with the States. Ultimate management is by the State. This approach has removed a great deal of the concern about Federal intervention.

As Assistant Secretary Herbst mentioned, we are conducting a Federal coastal program review with a report to be submitted to the President this summer which, among other things, is evaluating Federal infrastructure and supporting programs to determine the impact in critical coastal areas. This review is evaluating means to implement the President's goals to minimize loss of life and property in coastal hazard areas, and it is looking at other mechanisms such as special area management plans which might be used to protect barrier island ecosystems.

Mr. Chairman, NOAA does other things which in part Dr. Frank will address that are relevant to barrier islands and I will simply submit the rest of my testimony for the record.

Senator **Bumpers**. Thank you very much, Mr. Glazer.

[The prepared statement of Mr. Glazer follows:]

Statement of Michael Glazer
Assistant Administrator for Coastal Zone Management
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Before

The Subcommittee on Parks,
Recreation and Renewable Resources of
the Senate Energy and Natural Resources Committee

June 12, 1980

Mr. Chairman and Members of the Committee, I am pleased to appear today to provide comments from the National Oceanic and Atmospheric Administration on Senate Bill 2686, which directs the "Secretary of the Interior to provide for the protection of Barrier Islands."

I will present a brief summary of current NOAA programs related to management and protection of barrier islands.

Three components of the National Oceanic and Atmospheric Administration are currently involved in the protection and management of barrier islands--The Office of Coastal Zone Management, The Office of Oceanic and Atmospheric Services, and The Office of Fisheries.

Office of Coastal Zone Management

The Office of Coastal Zone Management (OCZM) is responsible for administering the Coastal Zone Management Act of 1972, as amended (the Act). Programs under three sections of the Act and activities initiated by the President's Environmental Message of August 2, 1979, affect management of barrier islands. I will describe each of these efforts briefly. In addition, I have attached as an appendix to this statement a detailed description by project of the Office's activities which directly or indirectly affect barrier islands.

1. Sections 305 and 306--State Coastal Zone Management Programs

OCZM provides funds to states to develop and implement coastal management programs. Under the Act, an approved state plan must include policies and procedures which will:

- assure appropriate protection of valuable natural coastal resources, such as wetlands, beaches, dunes, and barrier islands;
- improve management of development in coastal areas in order to avoid or mitigate losses of life and property; and
- better coordinate government activities at all levels.

Because barrier islands are valuable natural coastal resources and because improved management of development on such islands is essential to avoid losses to life and property, barrier islands have received significant attention in the development and implementation of state coastal management programs along the Atlantic and Gulf coasts.

Although the treatment of barrier islands varies from state to state, the state programs can be categorized generally. First, most states administer permitting systems which must take account of the values of such special resource areas as barrier islands. The specific provisions of the permitting system vary by state. New Jersey has a state level permit system which regulates large scale development; in Massachusetts the Wetlands Protection Act regulates development on barrier islands; the coastal regulatory programs in North and South Carolina are designed to protect barrier islands from development which would adversely affect their natural values; and Rhode Island has adopted a policy which prohibits development on undeveloped barrier beaches and has specific safety requirements for additional development on beaches which are partially developed.

Second, a number of states have enacted special area protection laws which have beneficial effects on barrier islands. Beach and dune protection statutes in state coastal programs in North and South Carolina, Texas, Alabama, Delaware, and Maryland, for example, have assisted in the protection of barrier islands through limiting development and subsequent losses in these erosion-prone areas.

Third, Federal approval of state programs has resulted in more stringent reviews of infrastructure decisions under the policies of those programs. For instance, South Carolina's management program includes policies to discourage new public investments in infrastructure--roads, bridges, sewers--on undeveloped barrier islands. Similary, New Jersey has adopted a Shore Protection Master Plan to give special review to infrastructure projects which might affect sensitive areas like barrier islands.

Finally, Section 306 funds have been used for special projects concerning barrier islands. For example, funds are used or proposed in Alabama, Louisiana and South Carolina to develop management programs for barrier islands and to study special problems such as erosion. Delaware is using funds to map its barrier beaches and, as a result, will establish a setback line on which new regulations for managing beaches and dunes will be based. Similarly, in some cases where barrier islands have already been developed and are experiencing problems, OCZM funds have been used to address these problems. For example Ocean City, Maryland is an intensively developed barrier island on which significant public and private investment is threatened by severe erosion. Since program approval in September 1978, the Maryland Coastal Zone Management Program has used Section 306 funds to study alternative methods of erosion control.

Adoption of these state programs is also beginning to have a direct effect on Federal activities on barrier islands. Section 307 of the Act--the so-called "federal consistency" provision--requires that Federal actions affecting the coastal zone be consistent to the maximum extent practicable with approved state programs.

In addition, the Senate has passed and the House of Representatives is considering bills to reauthorize and amend the Coastal Zone Management Act. The language of both bills presently include provisions that would strengthen the protection of barrier islands in important ways. Both explicitly state that the protection of barrier islands is in the national interest and both require the states to devote an increasing portion of their Federal grants to improvements in coastal management, including protection of barrier islands.

2. Section 308--The Coastal Energy Impact Program

The Coastal Energy Impact Program (CEIP) was enacted by Congress in 1976 to provide Federal funds to assist states and local governments to study, plan for, ameliorate, and accommodate the impacts of expanded energy activities in coastal and offshore areas.

To date, nine states have used CEIP assistance, totalling $1,624,780, to perform 28 separate planning studies which either directly or indirectly involve barrier islands. For examples, Louisiana has used CEIP funds to investigate the extent of damages to coastal marshes caused by energy activity and to devise strategies to prevent barrier island erosion and Texas has used CEIP funds to plan for the impacts of energy activity affecting Mustang Island and to perform ecological baseline studies of the surficial biology of marine and estuarine deposits in the vicinity of Corpus Christi. Maine, Massachusetts, New Hampshire, New Jersey, Rhode Island, and Delaware have all done similar planning and study with CEIP funds.

In addition to planning, the States of Massachusetts, Texas, and Louisiana have used CEIP funds to construct facilities on or affecting barrier islands. Massachusetts has two projects for oil spill clean-up. Texas has constructed beach improvements which are intended to attract people away from sensitive barrier island areas at Padre-Balli Island and Port Aransas. Louisiana has used CEIP funds to provide for beach clean-up on Grand Isle.

3. Section 315--Estuarine Sanctuaries and Island Preservation

Section 315 of the Act authorizes two programs with a positive impact on barrier islands. One has been funded, the other has not.

Section 315(1) provides Federal matching funds for planning, acquisition and operation of estuarine sanctuaries. Estuarine sanctuaries are relatively undeveloped estuarine areas that are set aside to serve as field laboratories for the study of natural and human processes within these coastal ecosystems. Thus far, seven sanctuaries have been designated. Four barrier islands are located in these estuaries. Three of these islands are in the Apalachicola River/Bay Sanctuary in Florida, and one is in the Duplin River/Sapelo Island Sanctuary in Georgia.

We have found the Estuarine Sanctuary Program to be a valuable tool for the preservation of these special resource areas. Several unique characteristics of the program have contributed to its success. First, since acquisition requires a 50 percent state match, Federal funds are leveraged to twice the purchasing power that would otherwise be available. Second, the program's location in OCZM assures a close link with the state coastal management programs. Third, the program enables states to pursue research, education, and recreation goals in a manner frequently not possible under Federal acquisition programs; although primarily a protection program, multiple uses of estuarine sanctuaries are permitted so long as they are compatible with the primary mission of education and research. Fourth, the program provides for state ownership and management of estuarine sanctuaries; this allows maximum local involvement, which often is a considerable asset to accomplishing resource protection efforts. Finally, state participation has made possible the use of a variety of less-than-fee acquisition techniques which have reduced overall costs.

Section 315(2) likewise authorizes Federal matching funds for land acquisition to provide for access to beaches and other coastal areas and for preservation of islands. This section has thus far not been funded. However, the Administration has taken a position in favor of reauthorization of Section 315(2) concerned with island preservation for two years at a level of $10 million. This section is similar in most respects to the estuarine sanctuary provisions and if reauthorized and funded, would offer many of the same benefits.

4. Federal Coastal Program Review

One final activity of OCZM of relevance to barrier islands is the Federal Coastal Program Review (FCPR), undertaken in response to the President's Environmental Message of August 2, 1979. The President's Message announced a national coastal protection policy to be implemented through CZM which provides, among other things, for the protection of significant natural resources (including barrier islands) and the management of coastal development to minimize loss of life and property from floods, erosion, and other coastal hazards. The President's Message also directed NOAA to conduct a review of Federal programs affecting coastal resources to assess their consistency with each other and with the objectives of the national coastal protection policy, and to determine whether Federal programs contribute to environmentally unsound or uneconomic development in coastal areas.

The FCPR, now underway, is evaluating major Federal infrastructure support programs for their impact in critical coastal areas such as barrier islands. Preliminary indications are that the secondary growth impacts of many of these programs, and the cumulative impacts of combination of these programs, may not be adequately considered in individual project decisions. This may in part be because no agency monitors all Federal agency decisions affecting these vital resources and there is no clear national barrier island policy.

The FCPR is also evaluating means to implement the President's goal to minimize loss of life and property in coastal hazard areas. As I noted earlier, barrier islands are, by their very nature, considered as areas subject to risk from natural hazards. We are working closely with the Federal Emergency Management Agency on this issue. Steps now under consideration by FEMA's Flood Insurance Administration--documenting risk more accurately by adding storm surge wave heights to insurance rate maps, moving toward actuarial insurance rates, improved means of providing disclosure of risk to potential home purchasers, actual removal of frequently damaged structures from high risk areas, and providing further technical assistance and incentives to communities to use their authority to minimize risks--are all positive steps that should lead toward improved management of barrier islands.

The FCPR is addressing as well the issue of whether Government programs have encouraged development of coastal hazard areas such as barrier islands. It will examine such matters as hazards mapping, insurance in hazard areas, relocation assistance, and economic incentives and disincentives that Federal agencies can use to encourage local governments to develop and implement plans to minimize growth in high hazard areas.

Through the FCPR, we are also looking carefully at other Federal activities in the coastal zone to assess their effects on coastal hazard protection, public access to the shore, and improved coordination through planning and permitting in special areas. This latter issue is relevant to barrier islands. It is becoming increasingly obvious that habitat protection can no longer be accomplished soley through fee simple acquisition by government agencies or through single-purpose regulatory frameworks that do not fully account for all public interests or provide timely conflict-resolution mechanisms. We may need to develop new strategies to facilitate the management of barrier island ecosystems that allow for the protection of the naturally functioning system--yet at the same time recognize important economic needs. Some case studies of prototype efforts at multiple agency system management do exist. Examples of such efforts are the recent New Jersey Pine Barrens legislation the Apalachicola River/Bay National Estuarine Sanctuary, the Grays Harbor Special Area Management Plan, and similar plans being developed in Coos Bay, Oregon and other coastal areas.

This summer we expect to complete work on the Review and to submit our report to the President, with recommendations for any necessary administrative and legislative changes.

Office of Oceanic and Atmospheric Services

In addition to the specific barrier island efforts undertaken by OCZM, NOAA's Office of Oceanic and Atmospheric Services (OAS) exercises NOAA's more general responsibility for emergency preparedness and warnings. A Coastal Hazards Unit was formed within OAS in fiscal year 1979 to coordinate these responsibilities in coastal areas.

By virtue of their precarious position, barrier islands play an important role in the work of OAS. The Coastal Hazards Unit is cooperating with FEMA and other agencies to assure that warnings reach residents of developed islands and that they respond. NOAA also provides climatological and oceanographic risk assessment information to local jurisdictions to assist in disaster planing. A national series of storm evacuation maps and storm surge predictive models are being produced to aid local and state emergency preparedness organizations. Additionally, several pilot projects in cooperation with state and Federal organizations are being pursued, to integrate all available risk data into comprehensive evacuation plans.

A major part of NOAA's hazard efforts is public education. The coastal population which has not experienced a hurricane or other severe hazard is growing each year, and coastal areas and islands present an attractive opportunity for settlement. NOAA is working with FEMA and the other agencies to assure that the public understands the severe risks of development and that warning and other emergency information are communicated promptly.

Office of Fisheries

The Office of Fisheries is the principal focus for NOAA's living marine resource management responsibilities. It exercises responsibility under and statutes as the Fishery Conservation and Management Act, the Endangered Species Act, the Marine Mammal Protection Act, and the Fish and Wildlife Coordination Act--each of which requires that close attention be paid to the impacts of human activities on habitat for the living resources.

Barrier islands provide important habitat for fish, shellfish, reptiles, and mammals which use the beach zones, streams, and wetlands of the islands. Barrier islands are also the principal U. S. spawning sites for various species of marine turtles, including several threatened or endangered species.

In implementing its habitat protection responsibilities, the Office of Fisheries works closely with other agencies to provide an assessment of the impact of proposed actions on fish and wildlife resources and their habitats including barrier islands, and to recommend measures to minimize or present damage to them.

* * *

This concludes my written testimony. I will be happy to answer questions the Committee may have.

Senator Bumpers. Dr. Frank.

STATEMENT OF DR. NEIL L. FRANK, DIRECTOR, NATIONAL HURRICANE CENTER

Dr. Frank. I was asked to say a bit about what a hurricane does to a barrier island. I appreciate this opportunity.

Let me start out by saying that hurricanes are not freak acts of nature that were designed to inflict death and destruction on mankind. We have a tendency to believe otherwise because that is the way we measure the impact, but that is not so.

You see, we get too much heat in the tropical regions, particularly in the summertime. We have to release this heat, and nature has devised a very effective way for doing it. It is called the hurricane, so when the hurricane forms in the summertime, it really represents a tropical atmosphere boiling, and as the hurricane moves out of the tropical regions, it removes heat.

Now if man would learn to live in harmony with nature, we could minimize our problems. If you go to California and build your house on a fault line, don't fuss about earthquakes. If you come to Florida, or you go to Texas and build your homes on one of the barrier islands, I am not sure we should fuss about hurricanes. I believe that hurricanes have a right to sweep the barrier islands occasionally. I am not really sure that man has a right to be there, and certainly to live there.

All right. Let's talk about the impact of hurricanes along our coastline. We have got a tremendous problem developing along the barrier islands along the coastline today because a lot of people have discovered the beautiful way of life out there.

In the decade of the 1960's while we had an increase of about 13 percent of the population in the United States, we had an increase of over 40 percent in the number of people who have located along the beaches and along the barrier islands.

Now hurricanes, the impact, I don't need to say anything about winds. Everybody knows hurricanes are winds. I don't need to say anything about rain. You all know there is rain, but one of the least understood aspects of a hurricane is the storm surge, and the storm surge is the element that has the devastation along the barrier islands.

This is a dome of water maybe 50 miles wide that sweeps across the coast near the point where the land falls. It is not an individual wave, but water well above normal with horrendous waves on top of it.

What does the impact of a storm surge have on a barrier island? Let's go back and review just briefly a few past hurricanes. In 1938, hurricanes swept into the northeastern part of the United States. One of the worst we have ever had up here devastated the south coast of New England and the eastern part of Long Island.

As an example, on West Hampton Beach, there were 179 homes on a barrier island before the storm. Only 12 remained after the storm. I was along that section of the beach about 3 weeks ago and I counted, counted 900 homes in that same area.

Let's go on down to the Jersey coast.

Senator **Bumpers**. How many of those homes would survive if we had another hurricane of comparable force?

Dr. **Frank**. Since they are near or in the same location as those that were destroyed in the 1938 hurricane, I really suspect that most of those would be destroyed again.

All right. You go to the Jersey coast, Long Beach Island. This is the place where in 1962 not even a hurricane but a spring storm washed over that island and made several cuts in it. It is interesting that just south of this there is a place called Brigantine Island. This is down just north of Atlantic City. There is an inlet that separates Brigantine Island from Atlantic City.

They have had a problem with that inlet down through the years because there is a natural migration of the sand from the north to the south, and it kept filling in that inlet, so the people there went to the Corps of Engineers a few years ago and said can you solve our problem? They said sure. We'll put a jetty along the north side of this inlet, and they put it there and it solved the problem. A big sand bar collected on the north side of that island, and within the last few years, the city of Brigantine has sold off that sand barrier to a private developer who is putting 250 homes there.

I went to city hall and said you have got a hurricane problem and they laughed at me and said we have been here 40 years and never saw a hurricane, and the records will show in the 1800's three severe hurricanes swept that coastline and devastated that island, moved it around and changed the orientation of it some.

You come on south into the outer banks of the Carolinas, all of the inlets that are there have been crated or filled as you go into the past history of hurricanes. An example of that would be again along Beach Island. I think this is a community that is located on what is called Hoke Island west of Wilmington, N.C. There were

357 homes in that community, before Hazel arrived in 1954, and only 4 of those remained after the storm, and yet there are 2,000 homes in that area today.

You come down the South Carolina coast and you have got Seabrook. You have got Kiawah, Hilton Head, and yet in 1893, 20 feet of water associated with a severe hurricane inundated all of the islands and 2,000 people were lost; 1893 was a good year for hurricanes because we had a bad hurricane on the Louisiana coast, and 2,000 people lost their lives in that particular storm.

As you move on south, we have got 60,000 people in the keys today; 30,000 of those are going to come north and visit when you post a hurricane warning on a two-lane road with nearly 50 bridges. I don't believe we can get all of the people out of there with the leadtime we can provide.

Sanibel Island has about 5,000 people. We never worried much about Sanibel because we figured you could evaculate it in less than 10 hours. A comprehensive study in Dade County this last year would indicate that indeed you can evacuate Sanibel in less than 10 hours if that is the only place you are going to evacuate, but if you evacuate all the rest of those places, you essentially double the evacuation time.

I don't even know what my problem is in terms of evacuation along the coastline today. We have got 60,000 people living in the offshore barrier islands off Tampa Bay. In 1975, Hurricane Eloise lashed the panhandle of Florida and 75 feet of beach there was destroyed, or the sand dunes. That is 15 to 20 feet was destroyed.

They had an interesting experience during Frederick this last year. It destroyed the Dolphin Island or did tremendous damage to a little community called Gulf Shores. If you go west of Gulf Shores, you come to a very narrow sandy spit, again, a barrier island. It is interesting that along that sandy spit there were 152 homes before the storm, 90 on the beach side, and 300 yards away on the bay side, 62 homes. Of the 90 homes on the beach side, 71 were destroyed, yet interestingly, only 300 yards back inland, only 19 of those 62 homes were destroyed, and the ones that were destroyed, many were destroyed by the beachside homes floating away and acting as battering rams.

Now the point I want to make to you is that with even a short distance of 300 yards, it has a tremendous impact in wiping out the energy of the waves, so the same amount of water hit the bayside that hit the beachside, but the wave action wasn't as severe just that far back.

You go into the south Texas coast, the Padre Islands, Hurricane Beulah in 1967 put over 30 new cuts through Padre Island. Any time the sand fills back in those cuts—I can take you there today and show you condominiums that have been built in those old cuts.

The same thing happened in North Carolina. The Holiday Inn on Riceville was built in a cut that was created by Hazel and there are some apartments there that are adjacent to that old cut, and they are having a terrible time keeping a beach in front of that apartment. They can't understand why. Let me go to Galveston. Galveston Island, as you have already heard, was the scene of the worst disaster we have ever had in the United States. We lost 6,000 lives. We built a 17-foot seawall there to protect the city. It is interesting, as you heard Senator Schwartz say, they are building on the west end of Galveston Island out beyond the seawall.

It is also very interesting that seawall has done a nice job of protecting the city, but has not done much for the beach. Their beach is gone today. A lot of that sand is on the southeast part of Galveston Island. A builder recently put a condominium on Galveston Island ahead of the seawall.

As you carry on your deliberations here on this very important legislation, I would submit to you that there is more than just an economic and physical resource on those islands. There is a human resource, and unless we do something very quickly in this country to protect that human resource, we may have a repeat of the Galveston-type disaster with the death toll to be at least that or maybe even greater.

I appreciate the opportunity to have come before you here today.

Senator Bumpers. Dr. Frank, it is a real tragedy that everybody in the U.S. Senate couldn't have heard your presentation this morning. This legislation would have absolutely no problem. If we could just get the message and those kinds of persuasive, compelling, really staggering statistics and revelations across—you know, really it is just another one of those cases where we are going to say well, we tried.

Obviously some of these people are going to lose their lives, but you can't always protect people against their own folly, but you can give them a good warning and the fact that this development just continues unabated, people looking for additional spaces on these islands and beaches, it is just a future prescription for disaster.

We are going to continue to have hurricanes, some of them of more intensity than others. Some will cause loss of lives, but here this bill only addresses, really we are not talking about human lives here, though that is obviously the most important element. You can't keep people from going there. You can't keep people from living there that already live there.

What we are trying to do is prevent exacerbation of an already existent problem. The Government has had to take over this insurance program because the private investors a long time ago realized they couldn't afford to do it, so they pulled out and now the Government is subsidizing this development at a rate of, I don't know, if it is true, Senator Schwartz said we are paying four times as much as we are collecting in flood insurance.

Ms. Jimenez, let me ask you this. You said you have a million, 800,000 policies in existence now?

Ms. Jimenez. Nationwide.

Senator Bumpers. How many of those are on barrier islands?

Ms. Jimenez. I can't give you a breakdown on barrier islands. We can give you a breakdown as to V zones. That would include coastal mainland as well as coastal areas of barrier islands.

Senator Bumpers. What is the breakdown?

Ms. Jimenez. I believe we have 4,800 new construction policies on barrier islands, and 52,000 existing construction policies. In other words, there are a total of about 56,000 structures that we are insuring in coastal areas, V zones.

Senator Bumpers. How does that compare with 3 or 4 years ago? Has the number gone up significantly every year?

Ms. Jimenez. Yes. It is going up significantly for several reasons. No. 1, that we are getting more communities participating in the program, and second, that it is a requirement that any time anybody gets a mortgage they buy flood insurance if they are in a V zone or in the 100-year flood plain, so that as construction increases, we are getting more policies.

Senator Bumpers. Every time we write a policy we are saying that we are going to give you this policy of flood insurance for you to build this new home in this area even though it is costing us four times as much.

Ms. Jimenez. As to new construction, they are actuarially rated. The new construction is built in recognition of the hazard and in conformance with our regulations and carries an actuarial rate.

Senator Bumpers. Why is it costing us $500 million in the last 3 years? Is this something new, the actuarial rate?

Ms. Jimenez. No. That has been in existence from the very beginning, but it is the new construction, or rather the existing construction that causes the most losses obviously because they were not built in recognition of the hazard. They are not elevated. They are built right on the ground level, and so they, of course, sustain worse losses.

Senator Bumpers. I have some additional questions for all of you in writing.

Senator Johnston.

Senator Johnston. I have no questions, Mr. Chairman.

Senator Bumpers. Thank you very much. I am going to ask our next two witnesses to also come as a panel—Mr. Vernon Behrhorst, Office of the Governor, State of Louisiana, and Dr. Evelyn Maurmeyer, University of Delaware.

Mr. Behrhorst, will it be possible for you to summarize your statement?

STATEMENT OF VERNON BEHRHORST, OFFICE OF THE GOVERNOR, STATE OF LOUISIANA

Mr. Behrhorst. Yes, sir. I have submitted my written statement for the record along with a number of accompanying documents which discuss in depth our situation in Louisiana.

I would like to mention that this statement which I am submitting for the record has been put together not by myself. I wrote it, yes, but some of our experts in Louisiana on barrier islands—I don't believe you will find a State in the United States where we have more eminent experts on this subject any place.

If we have a few more witnesses like we had previously, I wouldn't have anything to say because I think I could agree with practically everything that has been said before, and we certainly, as Senator Johnston has said, in Louisiana are not trying to promote development.

We know the situation and that we should do nothing to encourage development on these barrier islands. We had our own hurricanes, and some of them which Dr. Frank had mentioned.

There are several things which I believe I should add here not only for the benefit of the committee, but I would also like to mention it for the benefit of the people in this room so that they don't go away from here feeling that we are against preserving our barrier islands. We most certainly aren't, but we have some situations in Louisiana in which we do believe they need attention.

First of all, in line with some of the statistics that have been given this morning, on the barrier islands in Louisiana we have less than 3,000 people—I'm sorry—4,000, 3,000 of which are on Grand Isle.

Senator BUMPERS. How many on Grand Isle?

Mr. BEHRHORST. Three thousand on Grand Isle; less than 1,000 scattered along the coast which you have classified as barrier islands, some of which are really barrier beaches on the mainland.

Senator BUMPERS. Excuse me. How does that population compare with 10, 20 years ago, do you know?

Mr. BEHRHORST. The population?

Senator BUMPERS. On Grand Isle.

Mr. BEHRHORST. It was fairly close to that 10, 20 years ago.

Senator BUMPERS. There has been very little new development?

Mr. BEHRHORST. Very little new development; we can't look for much development for the major reason that there is a shortage of potable water on the island, and there is no way they can bring it in right now.

We are dealing with a small area, but when we talk about protection of our barrier islands in Louisiana, we are thinking of something a little bit differently than was expressed this morning. We are not talking basically about protecting them against man and his handiwork, building houses and motels and so forth on them.

In Louisiana, we use the word protecting barrier islands, we are talking about physically protecting their existence. Our islands are different, as has been said before. They are of deltaic origin, and we have had a dramatic decrease in sediment available for maintaining these barrier islands because of the physical geologic conditions. They are physically disappearing. They are not just shifting as all barrier islands do, but we have barrier islands which are half the size as they were. Some have disappeared completely, so we are physically putting a protective work zone, and this is one of the problems that we have with the legislation, that it would prohibit protective work of most kinds on these barrier islands.

Then, too, protection from man and his handiwork, we don't believe is really that much of a problem along the barrier islands of Louisiana. If I may briefly mention one, there are very little sand beaches on our barrier islands except on Grand Isle and some nearby. There are high organic materials from adjoining marshes, silt, shale. A lot of them are even mud on the beaches.

Two, then there is turbid water much of the year in the basin and along the gulf shore of our barrier islands.

Then I think more important, they are very, very isolated. Grand Isle is the only one which is accessible by highway. It is developed. It is not included in your bill. The others are not accessible by highway, and there are many, many miles of marshlands between them and the mainland which will prohibit by cost alone any access to them, so these things combined mitigate against development of our barrier islands.

Part of them are already State parks, and property ownership will prohibit development in others.

Senator **Johnston**. Mr. Chairman, may I interrupt to say I have got to go, and just congratulate Vernon Behrhorst on an excellent statement. He is really quite an expert on this. I look to him on water resource matters a great deal, so you can believe what he says.

Senator **Bumpers**. Thank you.

Mr. **Behrhorst**. Now very briefly here are some of the problems we have. I will not elaborate on them. I have discussed them with your staff already.

One, the more important one, is our barrier islands are disappearing. Our estuaries are disappearing, and our experts in Louisiana, whether biologists or otherwise, all agree that unless we physically retain these islands, our estuaries will disappear.

In the last 10 years, 900 square miles of marshlands adjoining these estuaries has gone from brackage and intermediate marshes to saline marshes, a lot of it due to the disappearance of our barrier islands.

Of course, as Senator Johnston mentioned, a very key issue is the legal one which was put on us by the Federal Government. We have an ambulatory coastline which is tied to the front of these barrier islands, and this determines our seaward boundary. The Supreme Court will change that. As these islands disappear, we lose part of our claim to the Continental Shelf which you know is rich in oil, gas and other minerals.

Then we have passed what is called the first use tax in Louisiana, a tax on the first use of natural gas in the State.

Senator **Bumpers**. Let me ask you a technical question. Are there 12 miles on the old Tidelands decision?

Mr. **Behrhorst**. We have 3 miles. Babe Schwartz got 10. We have three.

Senator **Bumpers**. Is that measured from the seaward side of the barrier islands?

Mr. **Behrhorst**. Yes, sir.

Senator **Bumpers**. It is not from the main coastline?

Mr. **Behrhorst**. It is not from the main coastline, what we call the baseline. That was a legal terminology. It runs along the front of our barrier islands. Then depending upon the rules, there are closing lines between the islands. I would be happy to supply you a map showing that if you wish.

Senator **Bumpers**. I would like to see that if you would, please. That is just a matter of personal curiosity on that point.

Mr. **Behrhorst**. I will be happy to do so. The first use tax, 25 percent of the proceeds of this tax are dedicated to protecting and stabilizing our coastline for this very purpose, and the bill under consideration would put a serious strain on our ability, say, in Louisiana to fill that, and so for this reason we have to take exception to provisions of the legislation under consideration.

The legislature last year passed two acts which have been implemented. One is a program to monitor the movement of our barrier islands, and a demonstration program directing the erecting of artificial barrier islands. This was mentioned by the representative of the Office of Coastal Zone Management. We use our impact funds for this; also a fresh water diversion study to help maintain our coastline has been implemented. The planning phase of that study has been included as an exhibit in our testimony.

Our new constitution which was passed here several years ago permits the property owner to reclaim land lost by erosion along our waterways and along the Gulf of Mexico. This has been implemented by legislation.

Provisions of the act could prohibit these people from exercising their constitutional right under the Louisiana constitution.

We also have the coastal zone management program. We have considerable information on how this dovetails in with the State preogative of managing their coastal zones under the coastal zone management program. We are anticipating approval of our program within the next month.

Now these are some of the problems we have, real problems that we see with this legislation as written.

This is I think the basic reason—one is that we don't see an overwhelming need because of the characteristics of our islands, and two, because of the problems I have given you, we don't believe that this legislation is really applicable to the State of Louisiana.

There are several of these terms that I would like to call to your attention that do need clarification. I have not mentioned energy production. I think you are well aware of the importance of these barrier islands to energy production, oil and gas, primarily related to the Outer Continental Shelf.

"This subsection shall not apply to activity related to energy development, navigational safety, public recreation, and protection of barrier island ecosystems."

I think we need clarification on activity related to energy development. This includes the dredging of channels, rigs going to the Outer Continental Shelf and other facilities.

Senator **Bumpers**. Most of those islands also have pipelines across them because you have to consider distribution or transportation of energy as well as development?

Mr. **Behrhorst**. That's right.

Senator **Bumpers**. I noticed that.

Mr. **Behrhorst**. So we need clarification on that. Location of siting of service facilities—we have looked at this in depth in our coastal zone management program, but that needs to be clarified here.

Public recreation: I just say this because we do have on some of these some isolated camps, cottages and so forth, but this prohibits a person who has a private camp out there, although he may be one of two on one of these barrier islands, from building a small boat dock, or is it applicable only to public recreation? I believe these people on these islands should be given some consideration and protection.

Protection of barrier island ecosystems—what is all involved here? You have no ecosystem if you have no island. Our islands are physically disappearing. What do we include in here? We believe that these terms need, maybe not in the act, but in the legislative intent, in the hearings and discussions, to be clarified.

Then I would like to note here it reminds me because we have been trying to preserve one of our early forts which is located on a

pages tightly bound

barrier island, there is no provision for taking care of in this section, of exempting historic and cultural preservation projects.

Senator **Bumpers**. That is an excellent suggestion.

Mr. **Behrhorst**. So I would suggest that be specifically spelled out in the bill, so these are some of the things that we have.

I have some comments on the composition of your proposed council. I will not take the time on that at this time, but I do emphasize that we are serious in not promoting development on the uninhabited barrier islands just as much as anybody else is, but we do have these unique problems that we certainly would like the committee to consider in this new deliberation.

I just would like to quote from Governor Treen when he was inaugurated on March 10. He went from the banks of the Potomac as a Congressman to the banks of the Mississippi as our Governor, but in his inaugural address Governor Treen said this:

> We will protect and manage our uplands, our wetlands, and our coastal zone in a prudent way so that we and those that follow us will enjoy forever the bounty of our renewable resources.

So this is our goal in the State of Louisiana.

Thank your sir.

Senator **Bumpers**. Thank you very much.

[The prepared statement of Mr. Behrhorst and the draft environmental impact statement follows:]

STATEMENT ON BEHALF OF THE STATE OF LOUISIANA

by:

Vernon Behrhorst
Office of Water Policy
Office of the Governor
State of Louisiana

on

S 2686 - To Direct the Secretary of the Interior
To Provide for the Protection of Barrier Islands
and
For Other Purposes

before

Parks, Recreation and Renewable Resources Subcommittee
of the Energy and Natural Resources Committee
of the United States Senate

June 12, 1980

Mr. Chairman, members of the Subcommittee, I am here representing the State of Louisiana and to present our State's position on S 2686, which you and a number of your colleagues have introduced.

In addition to this statement, I am submitting other items which will be useful in assessing the barrier islands of Louisiana, including their characteristics, the problems associated with maintaining them, and our rationale for requesting that they be excluded from the provisions of the bill under consideration. Accompanying my statement are: The State of Louisiana's comments on the Department of the Interior's Draft Environmental Impact Statement on Alternative Policies for Protecting Barrier Islands along the Gulf and Atlantic Coast of the United States; A publication on Shoreline Erosion in Coastal Louisiana prepared by our Coastal Resources Program; A Plan of Study for Freshwater and Sediment in Coastal Louisiana by the Office of Public Works, Department of Transportation and Development; A Statement by Dr. William McIntyre on Barrier Island Response; A Statement by the Louisiana Coastal Resources Program on Barrier Islands and excerpts from the draft Environmental Impact Statement of Louisiana's Coastal Resources Program. We have much additional information available. If you should desire more information we will be happy to provide it to the Committee.

In his May, 1977, environmental message, the President directed federal agencies in cooperation with state and local governments to, "develop an effective plan for protecting barrier islands". Subsequently, he issued Executive Orders 11988 - Floodplain Management and 11990 -

Protection of Wetlands. The National Park Service has also changed its policy regarding barrier islands; the Federal Emergency Management Agency has proposed changes in its rules and regulations; the Heritage Conservation and Recreation Service has completed a study on barrier islands; the National Oceanic and Atmospheric Administration has conducted a review of the many federal programs affecting coastal resources; and legislation, HR 5981, has been introduced in the House. Now, you have taken the legislative initiative to achieve similar goals. The President, in his message, stressed a cooperative effort among federal agencies and state and local governments. I can say, on behalf of the State of Louisiana, that we have received excellent cooperation, particularly from this Subcommittee and its staff. You have considered Louisiana's situation significant enough to send a member of your staff, Mr. Kutler, to Louisiana to observe our situation first hand. We wish to express our thanks to you for your consideration.

Incentives, mostly government sponsored, exist to build structures such as houses, hotels, businesses, and the highways and utilities needed to serve them in high hazard areas of our barrier islands even though often they can be located without too much inconvenience nearby, outside of the hazard area. Others because of their nature or functions, must be located in immediate proximity to the sea. For example, in Louisiana, those facilities required to service the offshore minerals industries - oil, gas and sulphur - most of which are located on the Outer Continental Shelf beyond Louisiana's territorial waters. These incentives must be re-evaluated in light of our current goal, especially since most coastal states have approved or are in the process of obtaining approval of coastal zone management programs.

S 2686 contains provisions which will discourage development on barrier islands and remove some of the incentives for development. These provisions are the establishment of the Barrier Islands Advisory Council, withholding federal expenditures and financial assistance to activities on barrier islands, and denying of federal licenses and permits for activities on barrier islands-with certain exceptions. Before commenting on these provisions I wish to briefly review with you the history of the formation of Louisiana's coast and some of our unique problems that have developed during its formation and because of man's intervention into it. This is necessary for an understanding of our position on the provisions of the bill under consideration. For a more detailed discussion of the Louisiana coast and its barrier islands, you may wish to consult the accompanying publications I have previously mentioned.

The word which best describes the coast of Louisiana, including the barrier islands, is "change", change which occurs as the mighty Mississippi disgorges water and sediment from 41 per cent of the United States into the Gulf of Mexico and upon the shores of Louisiana. This has gone on for thousands of years. During this time the amount of water and sediment has varies, and the mouth of the river has switched from one location to another along our coast many times. Within the past four thousand years the mouth of the river has moved at least six times and would have done so again by 1975 had not the Old River Control Structure been built to prevent the capture of the Mississippi by the Atchafalaya. During the high water season water spilled over the banks of the Mississippi and its distributaries, depositing sediments and nutrients to nourish our marshlands and build new deltas as the river changed it course. Winds, waves, and currents of the Gulf then eroded, sorted, and redeposited these materials to form the barrier islands, beaches, shell reefs, and mudflats which make up our shoreline.

This process continued unabated until man came on the scene and began to restrict this overbank flow by constructing levees which were, and still are, necessary. One-half of the State of Louisiana and two-thirds of our population and activities depends upon levees for protection from floods. We cannot exist without them.

But with the good came the bad. Most of the sediments carried by the Mississippi are now deposited in the depths of the Gulf of Mexico where they are not available for nourishing our marshlands and shoreline. As a result of natural changes - shifting of the mouth of the river, reduction of sediment load, and subsidence - and the handicraft of man, principally levees; within the last several hundred years the coast of Louisiana has ceased to advance. It is not even stable but retreating rapidly, including the landward retreat and deterioration of our barrier islands. A major exception is Atchafalaya Bay which is rapidly being transformed from water to land. Of the 800 miles of shoreline directly on the Gulf, 71 percent is retreating and only 29 is stable or accreting. Many incidents can be cited about what is happening along our coast: light houses once on dry land now are far in the Gulf, roads destroyed, and houses undermind. The loss is evident.

Because of the foregoing circumstances, Louisiana and its citizens find themselves in a constant battle to protect and preserve our shoreline, including our barrier islands. Therefore, the State of Louisiana cannot subscribe to any policy which precludes any attempt to restrain the natural processes of erosion, deposition, dune formation, and inlet formation on barrier islands as it might apply to Louisiana's coastline. This policy may be appropriate for the eastern Gulf of Mexico and the Atlantic Coast where the coast is in more of a state of equilibrium, but it is not appropriate for protecting and preserving the coast of Louisiana which is sediment deficient.

To some "protection" is protection against the encroachment of man and his handyworks. In Louisiana, "protection" is protection against the forces of nature which flood us, which are robbing us of our marshlands at a rate of 16.5 square miles a year, and which are eroding away our barrier islands at a rate approaching 100 feet a year. Once these barrier islands are gone, our valuable estuaries, the most productive in the Nation, will be badly damaged or destroyed. Our barrier islands must be preserved and protected. This requires the use of devices such as breakwaters, groins, rip-rap, beach nourishment, and artificial dunes and islands depending upon the circumstances. In Louisiana our most valuable assets are agriculture, petroleum and fisheries: agriculture will certainly remain an important portion of the economy; petroleum extraction and development are now declining and are projected to continue; fisheries and wildlife harvests were our first industry - and will remain long after the oil and gas are gone. We, therefore, list as top priority the enhancement and "protection" of our most valuable renewable resources. The barrier islands buffer the effects of saltwater intrusion and land loss in our estuaries which nurture 25% of the nation's fishery production.

In addition to the need to maintain the integrity of our barrier islands for their role in preserving our estuaries, we need to stabilize their shorelines as they govern the ownership of territory by the State of Louisiana.

In the Tidelands Case, the United States Supreme Court ruled that Louisiana has an "ambulatory" coastline from which we measure our seaward boundary. The location of our seaward boundary determines the ownership of valuable mineral deposits on the Continental Shelf. According to the Supreme Court decree of 1975, our seaward boundary has been temporarily established but is subject to modification by the Court, based upon changes in our coastline. Regrettably, most of our coastline is eroding. This erosion will also effect our lateral seaward boundaries and ownership of water bottoms in our bays and estuaries.

Additionally, our new Constitution, which was overwhelmingly approved by the voters of Louisiana in 1974, contains an article which authorizes private property owners to reclaim waterfront property lost by erosion to the State. Subsequent statutes have implemented this Constitutional provision. Therefore, neither I nor anyone else representing the State of Louisiana can support any proposal that will deny our State and its citizens the legal right to protect, preserve and restore their property.

I cannot oppose something without suggesting an alternative plan of action. The State of Louisiana has already taken positive steps towards preserving and protecting our coastline. The Louisiana Legislature, in 1978, enacted the "first use tax" which places a tax upon the first occurence within the state of any use of natural gas as defined in the act. Twenty-five per cent of the tax is dedicated "exclusively to fund capital improvement projects designed to conserve, preserve, and maintain the barrier islands, reefs, and shores of the coastline of Louisiana". This dedicates a substantial amount of money for these purposes.

In 1979, the Louisiana Legislature took additional steps by enacting two bills; one provides for precisely monitoring the location and movement of our barrier islands and establishes demonstration projects of methods for stabilizing them, and the other bill provides for a study of the feasibility of diverting fresh water from the Mississippi River and other streams into our coastal marshes to maximize their fish and wildlife producing capacity. A copy of the plan of study is enclosed. This will also help mitigate the loss of wetlands to other uses. Both of these bills were enacted as amendments to Louisiana's Coastal Zone Management Act, and are now integral parts of our CZM program. We are expecting approval of our program very soon at which time the consistency provision of the federal CZM act which governs federal actions will be applicable. Provisions of the bill under consideration are in conflict with Louisiana's CZM program, a conflict we must resolve.

We recommend in order to resolve this conflict that the barrier islands along the Louisiana coast be managed within our Coastal Zone Management Program and be excluded from the provisions of S 2686. We believe that we can achieve through our Coastal Zone Management Program objectives similar to those that you are trying to achieve in S 2686, without doing violence to our strongly held belief that both the prerogative and responsibility for managing our land lies with state and local government. The guidelines governing barrier islands contained in our accompanying draft Environmental Impact Statement are ample evidence that the State of Louisiana intends to manage her barrier islands consistent with the Findings and Statements of Policy contained in S 2686.

The citizens of Louisiana are already frustrated over federal encroachment into affairs which we consider to be under state and local jurisdiction. The Fish and Wildlife Service has recently proposed that the federal government acquire 443,000 acres of the Atchafalaya Basin, the Nation's largest overflow swamp. This proposal has been officially opposed by a concurrent resolution of the Louisiana Legislature. Also, as much of Louisiana is classified as wetlands and subject to Corps of Engineers and EPA regulatory jurisdiction, you can appreciate our wariness of any further intrusion of the federal government into our affairs. Furthermore, we are concerned over the ever increasing requirement for acquiring larger and larger acreages of wetlands for mitigating of fish and wildlife habitat losses.

Let us now address the very crucial matter of mineral production which is of national concern. The first offshore oil well in the United States was drilled within sight of Point Au Fer which has been designated a barrier island. Subsequently, hundreds of wells have been drilled on and in close proximity to barrier islands. Also, numerous pipelines and facilities needed for mineral production on the Outer Continental Shelf pass through or are located on barrier islands. These are essential support facilities for our mineral industry.

Section 3(b)(4) provides that this Subsection shall not apply to activities related to energy development. We applaud this exemption because Outer Continental Shelf oil and gas activities could not occur as they are today if it were in affect at this time. We do, however, have a problem with the definition of "activities related to energy development". Having gone through a lengthy debate in Louisiana over authority for siting of oil and gas wells, we are keenly aware that there is a gray area in the term "activities related to energy development". If the bill is enacted, you must either spell out in the bill itself this definition or it must be defined by legislative intent.

We can make similar comments about the other two terms, "public recreation" and "protection of the barrier island ecosystem". By confining the exemption to public recreation the term can be interpreted to mean that a private property owner who already has a camp or cottage on a barrier island could not construct the smallest boat dock on his property because it does not come under the definition of "public recreation". Likewise, what is included in the definition of "barrier island ecosystem"?

I wish to make several comments about specifics in the bill under consideration. In Section 2(c), the membership of the Barrier Islands Advisory Council is given. First of all, the Department of Commerce is included as a member but we believe that it should be spelled out that the Office of Coastal Zone Management should have a voice in establishing barrier island policy. Likewise, the Department of Defense is included in the membership. It should be specifically mentioned that the U.S. Army Corps of Engineers is a member of the Council as it has both planning and construction responsibilities on barrier islands, as well as permitting authority under Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Water Pollution Control Act. This is probably the most important responsibility of any federal agency. Moreover, as I previously mentioned,we believe management of our land including our barrier islands is primarily a prerogative of state and local government. You certainly should have representation from state government t least, with possible representation from the National Governor's ssociation. Above all, the Water Resources Council is not included in he membership on the Council. I might suggest that because this bill s as its primary objective the preservation and protection of undeveloped rrier islands which are primarily wetlands, the function of the Barrier lands Advisory Council could properly be made a function of the Water

Resources Council, thereby retarding the proliferation of bureaucracy.

We have not had an opportunity to examine the maps of the "barrier islands protection system" mentioned in Section (a). In order to make complete comments on the proposed legislation we will need access to these maps. We will also suggest that if the bill under consideration becomes law that the availability of the maps be more widespread than just in the "Office of the Secretary of Interior in Washington, DC". Also, as the bill would have a great affect upon the issuance of licenses and permits, the boundaries of "barrier islands and portions of barrier islands" need to be precisely shown on maps so that people will know if they are or are not subject to the provisions of the bill.

Section 3(c) authorizes the Secretary to make "minor boundary revisions". What do we mean by "minor"? Also, there are no provisions for public hearing or notice of the revision by the Secretary.

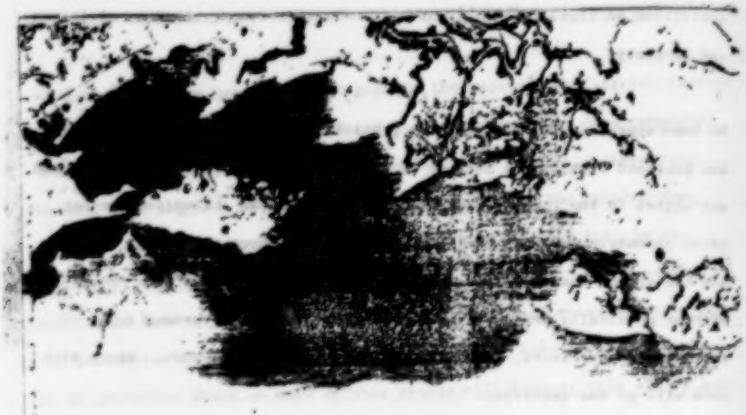
I have already made our comments on Section 3(b), and our reasons for not being able to support them as written.

I do not want you to believe that we are opposed to the purpose of this legislation. We certainly are not unaware and are very mindful of the many problems associated with development in high hazard areas such as barrier islands. Two weeks ago the New Orleans International Hurricane Conference was held. Two of the four sponsoring agencies were the Orleans Levee Board and the City of New Orleans. A major topic at this conference was the devastation wrought by Hurricane Frederick upon barrier islands along the Mississippi, Alabama and Florida coast and the need to modify and restrict activities on these barrier islands if we are to reduce the loss of life and property.

We have expressed our concerns for provisions of S 2686, the House bill, and proposed regulations because of the adverse affect they will have upon activities in the coast of Louisiana. Many of these activities can not exist elsewhere. We are particularly concerned about the energy industry and the affect they will have upon our very valuable estuaries. Moreover, without physically protecting our barrier islands with various types of shore protective works, we soon will have no barrier islands. Along with them will go our estuaries.

Please do not interpret this as encouraging development on barrier islands. The fact of the matter is Louisiana has less reason than any other state to be concerned about development on her barrier islands because of lack access, particularly by road, and their physical characteristic with limited sand beaches and high turbidity in the water adjoining them. My comments may appear to be unduly critical. However, I wish them to be construed as being analytical and constructive. In Louisiana, we are trying to achieve the same goals. Continuing to work together they can be achieved.

Governor Dave Treen, in his inaugural address in March, gave direction to what we are doing in Louisiana when he said, "we will protect and manage our uplands, our wetlands, and our coastal zone in a prudent way so that we and those that follow us will enjoy forever the bounty of our renewable resources".



LOUISIANA COASTAL RESOURCES PROGRAM

DRAFT ENVIRONMENTAL IMPACT STATEMENT

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
OFFICE OF COASTAL ZONE MANAGEMENT

and

LOUISIANA DEPARTMENT OF
TRANSPORTATION & DEVELOPMENT
COASTAL MANAGEMENT SECTION

The Coastal Management Section of DOTD and the staff of the Port of New Orleans believe that because of the tremendous economic and physical impacts of the Port of New Orleans and its navigable waterways as well as the unique needs of the Port, that the Port and its navigable waterways should be managed as a special area.

The special area would consist of those land and water areas, subject to the jurisdiction of the Board of Commissioners of the Port of New Orleans, which are required for the operation and development of the Port of New Orleans. The Coastal Management Section of DOTD and the staff of the Port of New Orleans are working together to develop a management program that will allow the Port of New Orleans to remain a viable international deepwater port and at the same time minimize any detrimental effects that any dredge and fill operations may have on the coastal zone.

The basic guidelines developed for the management program would balance the continuing need for the modernization of the port area and its navigable water corridors with increased concern about the environmental damage that these corridors create. The management program would address the need for the modernization of the port facilities and the necessity of widening and deepening particular navigation channels. The program would also contain measures for addressing erosion and siltation problems which are affecting many of the present shipping canals. Additional efforts would made to limit the amount of saltwater intrusion caused by the existence of navigation channels. The management program would also contain guidelines on the use of spoil disposal as a method for the creation and restoration of marshlands. In summary this program would allow for the necessary continuing development of the Port of New Orleans and also provide mitigation the damages to wildlife habitats associated with port and channel expansion.

Barrier Islands

The value of the barrier islands to Louisiana cannot be underestimated. The safety of the coastal zone and the ecology of the wetlands are dependent on these islands. The extent of Louisiana's Submerged Lands Act jurisdiction is also dependent on their existence.

Barrier islands represent the first line of defense against hurricane forces and marine processes. Tidal inlets associated with the islands, reefs and Gulf shore are also the control valves of the estuaries, regulating the inflow and outflow of Gulf water. The islands are also invaluable as wildlife habitats and scenic-recreation areas. These features are, however, undergoing rapid changes as a result of coastal erosion, regional subsidence, hurricane damage, and the alteration of the natural sediment cycle of the Mississippi River. Canal dredging through the barrier islands and on the bay side of a number of the islands for oil rig locations and pipelines has also seriously increased their vulnerability to storm surge damage.

The unique problems of barrier islands require special management techniques which would not apply to other coastal features. For this reason, DOTD is considering the designation of Louisiana's barrier islands as a generic special management area.

Various methods to protect and restore the barrier islands would be developed as part of a barrier island special management plan. These include natural and manmade solutions to curb erosion, special regulations concerning dredging and other activities, the use of appropriate dredge material for the restoration of barrier islands, and the development of methods to recreate the natural sediment cycle to the barrier islands including the development of pumping or siphon stations, similar to the Violet Siphon in St. Bernard Parish, to reroute river water and sediment.

The development of such management plans for barrier islands would be integrated with DOTD studies pursuant to an amendment to Act 361 made in the 1979 legislative session. Section 213.10 (G) of Title 49 of the Louisiana statutes, specifically requires DOTD to develop an indexing system of critical areas and areas subject to rapid change, including barrier islands. It also mandates DOTD to undertake a pilot program to create artificial barrier islands to determine their effectiveness in controlling shoreline erosion.

Areas of High Erosion

One approach to erosion control along the muddy shorelines of large coastal lakes and bays, recognized in Section 213.10 (G), would be the construction of artificial barrier islands using structural methods. The islands typically would be one fourth to one half mile in length and separated from the shore by a shallow lagoon. Passes would be left between individual islands.

Although this type of erosion protection would be relatively expensive, it has a number of important advantages. Islands would not only prevent erosion, but would also reduce storm surge without destroying the important natural land-water interface along the estuary margin. Marshes and swamps could be maintained in a natural condition landward of the lagoons. The islands would not only significantly reduce the erosion problem without damaging the estuary, but could actually enhance the total environment.

Barrier island construction would create new, diversified habitats. These would include beaches, vegetated island crests, lagoon fringing marshes, tidal passes and lagoons. Increased recreational opportunities resulting from this approach are particularly attractive. The beaches and passes would be ideal for surf fishing and other water contact recreation. Island backslopes and crests provide picnic areas and camp sites, and lagoons could function as small boat shelters. The new natural environments could also provide wildlife and fishery habitats. These would include lagoons for oyster beds, passes for fin fish and crustaceans, fringing marshes and lagoons as estuarine nursery areas and habitat for migratory waterfowl, fringing marshes and regulated island crests as mammal and reptile habitats, and beaches, passes and island crests as habitats for shore and wading birds.

Man-made barrier islands should be constructed on the margins of large lakes and bays in places where the wetlands are of high value for recreation and/or as estuarine nursery areas and wildlife habitat. A typical application would be along the western margin of Lake Borgne, where erosion is not only destroying valuable marshes, but also is destroying a

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Minimize, whenever feasible and practical, detrimental impacts on natural areas and wildlife habitat and fisheries by such means as encouraging minimum change of natural systems and by multiple use of existing canals, directional drilling, and other practical techniques.

- Guideline (1.7)(p) states that all uses and activities shall be planned, sited, designed, constructed, operated and maintained to avoid to the maximum extent practicable significant adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands.
- Several guidelines provide for specific protection of critical habitat areas and wetlands, including guidelines 1.7(e), 1.7(o), 2.1, 3.1, 4.2, 4.4, 6.4, 8.1, and 10.1.

(3) Flood Plains, Barrier Islands

In determining the national interest in flood plains, erosion hazard areas, and barrier islands, the following documents, legislation and federal agencies were consulted:

- Flood Disaster Protection Act
- National Flood Insurance Act of 1968
- Water Resources Development Planning Act of 1974
- The President's Executive Order on Floodplain Management (May 24, 1977)
- Department of Housing and Urban Development
- U. S. Army Corps of Engineers

The major objectives of the national interest in these areas is to avoid the long and short term adverse impacts associated with the occupancy and modification of floodplains, erosion hazard areas, and barrier islands.

The Louisiana Coastal Resources Program considers these major objectives in the following manner:

- The goals specified by Act 361 for the development of the coastal use guidelines recognize the value of special features such as barrier islands.
- The guidelines provide that:

(a) Proximity to and extent of impacts on important natural features such as beaches and barrier islands be considered in the permit decision-making process (1.6(e)).

(b) all uses and activities shall be planned, sited, designed, constructed, operated and maintained to avoid to the maximum extent practicable:

(1) destruction or adverse alterations of streams, wetlands, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features (1.7(e)) and

(2) significant increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards (1.7(t)).

(c) Linear facilities shall not traverse or adversely affect any barrier island.

(4) Historic Sites and Cultural Resources

In determining the national interest in historic sites, the following documents and federal agencies were consulted:

- The Antiquities Act of 1906
- Historic Sites Act of 1935
- Archaeological and Historical Preservation Act of 1974
- National Historic Preservation Act of 1966 (Executive Order 11593), amended under the Land and Water Conservation Fund Act of 1976.
- National Environmental Policy Act of 1969
- National Park Service

The major objectives of the national interest in historic sites and districts have been identified to be:

- To afford protection to significant historic (including archaeological sites) from adverse impacts;
- To consider cultural resources in assessing th environmental impacts of proposed activities.

The Louisiana Coastal Resources Program considers the national interest in historic sites in the following manner:

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COMMENTS OF THE STATE OF LOUISIANA ON DEPARTMENT OF THE INTERIOR, ALTERNATIVE POLICIES FOR PROTECTING BARRIER ISLAND ALONG THE ATLANTIC AND GULF COASTS OF THE UNITED STATES, AND DRAFT ENVIRONMENTAL IMPACT STATEMENT PREPARED BY THE GOVERNOR'S OFFICE OF WATER POLICY, APRIL 2, 1980

The following comments were prepared by the Governor's Office of Water Policy in conjunction with a number of agencies of the State. These agencies were the Department of Justice, the Department of Culture, Recreation and Tourism, the Department of Natural Resources, the Department of Public Safety, the Department of Revenue and Taxation, the Department of Transportation and Development, and the Department of Wildlife and Fisheries.

A thorough analysis of the proposal was impossible because of the lack of detailed map showing the areas which are affected. Some of the areas are contained in the barrier island units which are depicted on large scale maps for accompanying HR 5981, a bill to establish barrier island national parks and for other purposes. However, the barrier island units contained in HR 5981, are not all the same as those contained in the Department of the Interior proposal. The Interior proposal includes barrier islands East of the Mississippi. They are not included in HR 5981. Also, 5981 includes barrier island units from the mouth of the Atchafalaya River to the Texas border which are not contained in the Department of the Interior report.

With regard to the islands included in the tables and Appendix B, one is listed as Bastian Island. The correct name for that island is Lanaux Island. It separates Bastian Bay from the open Gulf. We see no reason for including some of the islands. They do not have the characteristics of barrier islands and are actually located behind the barrier islands of Breton Island and Grand Gosier Island. These islands are Sable Island, Raccoon Point, Coquile Point, and Bird Island. Although High Island is actually in Texas instead of Louisiana, it should be noted that High Island itself is not a barrier island. It stands a short distance away from the coast and was formed by the intrusion of a salt plug raising the surface above it. We make these comments in light of the fact that the identification of barrier islands in the report was not based entirely upon detailed observation and information and that the list may be modified in the final copy of the report.

Louisiana receives only the most cursory attention in the materials presented in the DEIS. Although eighteen Louisiana islands were included in the DEIS study, the only direct reference to these islands can be found in tables and appendices accompanying the written materials. The materials do not address, nor do they even attempt to address, the specific (and generally unique) characteristics of Louisiana's barrier islands. As will be explained in greater detail below, it is apparent that the individuals compiling the DEIS had conceived of Louisiana's barrier islands as falling within a general category comparable to the barrier islands of other coastal states. This approach is certainly fallacious, and indicates significant inadequate study of the environmental regimen of Louisiana's barrier islands. It is therefore our contention that no reasonable decision can be made on the basis of the materials presented in the DEIS.

Page xiv contains an excerpt from President Carter's environmental message of May, 1977. In this message, the President directed various federal agencies in cooperation with state and local governments to "develop an effective plan for protecting barrier islands". Throughout the remainder of the DEIS, the document speaks of protection of barrier islands without ever defining the use of their term "protection". It is obvious from the approach taken by the HCRS that their concept of "protection" does not include any actions to preserve the islands in their existing conditions. This is particularly evident in their approach as explained below.

On Pages 51 and 130 of the DEIS, the HCRS speaks of continuing natural processes and the survival of barrier islands being tied to these continuing processes. From the research we have done to date, this statement would appear to be factually inaccurate as applied to the continued existence of Louisiana's barrier islands. The natural processes of barrier islands formation as experienced along the Atlantic coast bears no relationship to the erosion and degradation experienced by Louisiana's barrier islands. Consequently, the position taken that "protection" must be associated with allowing natural processes to continue is inaccurate as applied to Louisiana.

The emphasis on allowing continued natural processes to erode barrier islands is shown by the National Park Service policy addressed on Page 7 of the DEIS and contained in full text in Appendix E. Despite the fact that the HCRS recognizes the value of estuaries which are protected by barrier islands (see page 60) the HCRS asserts that barrier islands can withstand the forces of nature. It is our understanding that, absent protective measures to maintain the barrier islands, delicate estuarine areas protected by the islands will be subjected to the forces of the open Gulf waters, and subsequently destroyed. It is therefore a basic contradiction of terms to assert the value of barrier islands as including protection of the estuarine areas and, in the same breath, stating the islands should be allowed to erode thus destroying the estuarine areas.

The materials presented on Pages 61-63 of the DEIS supposedly describe topographic variations for barrier islands. The topography described does not indicate any insight into the environmental status of Louisiana's barrier islands. It is our understanding that this portion of the DEIS was prepared primarily by coastal environment experts from Massachusetts. These experts apparently had little knowledge of islands such as those found off of Louisiana's coast. As a result, the entire section on topographic variation and all related materials following thereafter have limited relevance and are only partially descriptive of Louisiana's barrier islands. Clearly no resonable decision can be made with respect to Louisiana's barrier islands until an accurate, thorough and detailed study is made of the environmental characteristics of Louisiana's islands.

Table 7 contained on Page 87 of the DEIS again evidences the failure of HCRS to recognize the unique characteristics of Louisiana's islands. In this Table the barrier islands are separated on the basis of the Mississippi Delta east to Florida versus the Mississippi Delta west to Texas. Louisiana's islands are therefore described in concert with those states to the east or west rather than independently as should be done. The fact that the HCRS has separated the islands at Louisiana indicates some partial recognition of the special environmental nature of Louisiana's islands. However, for whatever reasons, the HCRS fails to take the necessary next step and explain why there is a special distinction to be made between eastern and western islands at Louisiana.

A basic conflict exists between the HCRS proposal for continuing natural processes and materials presented in the report on Pages 13 and 20. On Page 13, Executive Order 11990 states that agencies should act to minimize the destruction, loss or degradation of wetlands. This same feeling is reflected in Option 2a on Page 20. Louisiana's barrier islands include a large proportion of wetlands. Allowing the islands to erode would appear to be in direct conflict with efforts to minimize their destruction.

In the same vein, Page 10 of the DEIS addresses coastal zone management. The NOAA has recently proposed guidelines which call for the protection and maintenance of barrier islands under the concept of coastal zone management. It would appear that the proposed NOAA guidelines are also in conflict with proposals to allow islands to erode by natural processes.

Several comments in the DEIS are of critical importance to Louisiana's oil and gas producing industry. On Page 21, Option 6 states that energy facility siting should be restricted. The materials do not explain what energy facilities are included in this restriction and do not provide justification for such a restriction. Similarly, Option 2 on Page 34 states that 404 permits under the Clean Water Act should be denied for barrier islands in all cases except when there is an overriding national interest. Unless and until the production of oil and gas is determined to be an overriding national interest, the adoption of the approach recommended on Pages 21 and 34 would significantly hamper the ability of oil and gas producers to operate in Louisiana. Such prohibitions are clearly unjustifiable in light of the present energy needs and particularly so with respect to facilities which have no permanent human habitation associated therewith.

With respect to human habitation, it is apparent that development of barrier islands for human habitation is the key problem which the program attempts to address. This problem is first noted on Page xv and is referenced in varying degrees consistently throughout the DEIS. At the present time, the only Louisiana island which qualifies as "developed" for this DEIS is Grand Isle. Consequently, the concerns of the Federal Government for protecting islands from human habitation are overstated as applied to Louisiana. Only Grand Isle is accessible by highway. Table 16 incorrectly gives two islands as being accessible by bridge. Moreover, it is highly unlikely that any more of the barrier islands will ever be connected to the mainland.

Page 7 of the DEIS contains an example of the National Park Service planning for control of a barrier island. It is extremely disconcerting to see that the recommendations include a prohibition against anti-mosquito ditching. We are quite sure that the Louisiana Department of Health and Human Resources, or the health experts at LSU could provide a significant amount of material to support anti-mosquito ditching in Louisiana. The mosquito infestations experienced by Louisiana have included disease carrying mosquitos. Consequently, any attempt by the Federal Government to restrain state activities at curtailing mosquito breeding would be directly contrary to the best interest of public health and safety.

The DEIS contains only the most cursory investigation of the socio-economic effects of the federal proposal. Page 119 contains a brief reference to oil and gas operations and fisheries production in the vicinity of the barrier islands. Apparently no attempt has been made by the HCRS to ascertain the detrimental effects of the federal proposals on oil and gas operations or fisheries production. As such, no reasonable decision can be made until a detailed study is done in these respective areas.

On Page xvii, it states that this document does not conform to the requirements of the National Environmental Policy Act. Unfortunately, it does not indicate whether there will be an additional draft EIS which does conform to the requirements of NEDA before the issuance of a final environmental impact statement. Because of the foregoing deficiencies as they relate to the barrier islands on the Louisiana coast, we strongly urge that an additional draft environmental impact statement be completed and circulated for comment before a final environmental impact statement is published.

One particular area of concern which we have not included in this statement is the affect of any program upon Louisiana's territorial integrity and boundaries. This, along with the need for stabilizing our barrier islands, is explained in the statement of the State of Louisiana by the Office of Water Policy before the House National Parks and Insular Affairs Subcommittee of the Interior and Insular Affairs Committee on March 27. As most of these comments are equally applicable to HCRS's proposal, a copy of that statement is included as part of our comment. Also, several agencies have forwarded their comments directly to HCRS.

We will be happy to supply you with further information or meet with HCRS representatives any time it may be of benefit to all concerned.

BARRIER ISLAND RESPONSE

Dr. William McIntyre

Center for Wetlands Resources Louisiana State University

Because of the complex deltaic silting of Louisiana barrier islands, they are dissimilar in origin and maintenance from others in the United States and should not be regulated by the same ordinances.

Coastline retreat and barrier island reduction occurs along the entire Louisiana Gulf Coast except at the modern Mississippi and Atchafalaya deltas, and Grand Isle, which has been artificially stabilized. Although highly variable, rates of retreat along the entire coastline as measured between 1812 and 1954 averaged about 10 feet annually. Along the seaward edge of Lafourche Parish, however, the retreat averages more than 60 feet per year. For barrier islands west of the Mississippi River the annual retreat rate averages 35 feet, and on the east side (along the Chandeleur Island chain) the rate equals about 25 feet per year. In addition to coastline retreat, the barrier island land masses are dramatically decreasing in size through inlet widening, breaching of the island during storms creating numerous washover channels, and erosion on the leeward (bay or estuary) side of the islands. During the period 1922 through 1978, the barrier islands have been reduced approximately one-half in size. Extreme cases represented by individual islands are Grand Gosier Island (southern end of Chandeleur Islands) and East Timbalier. The former was a five mile long island in 1954 and is presently a shoal. The latter is experiencing severe erosion.

During its existence the Mississippi River has formed at least five different and distinct deltas in the Gulf of Mexico. These deltas extend far seaward of the present coastline. The river deposits over 300 million tons of sediment annually into the Gulf, most of it deposited in deep water offshore. As the Mississippi River changes course, the old delta suffers a loss of sediment and begins to deteriorate.

Louisiana's barrier island characteristics are related to and experience all of the same processes functioning in deltaic development and deterioration. They owe their origin to this deterioration and are genetically different from those that dominate the coasts in other parts of the United States. They experience subsidence that results in land surface lowering and sea level rise. They are primarily comprised of deltaic fine sands in limited quantities, and along inactive delta fronts, neither the quantity or composition of sediments is sufficient to sustain them indefinitely. In comparison with other barrier islands in the United States, Louisiana is essentially a muddy coast.

Deltaic building over the past several thousand years has concentrated huge amounts of sediments at the mouths of the distributaries. The weight of this deposition into the Gulf of Mexico has bowed down the ancient underlying beds in a fashion similar to a giant ladle that deepens seaward beneath the thick sections of unconsolidated material. The same land surface presently exposed along the north shore of Lake Pontchartrain has been depressed to about 500 feet below the surface at Grand Isle. Compaction of sediments within the unconsolidated column produces the most rapid rate of surface lowering. Although highly variable between different compositions of sediments and from place to place, subsidence rates increase seaward, with the most rapid sinking occurring in the newly-deposited Modern Delta and coastwise along the barrier islands. Local subsidence also occurs. This is caused by heavier features or objects such as beaches, natural levees, spoil banks, buildings, tide gauges, and bench marks sinking by their own weight. Deposits of peat or sediments, comprised of high quantities of plant remains, shrink when dried or dewatered. This process contributes to surface lowering. Sea level rose worldwide from glacial meltwater to where it reached its approximate present stand 3-4,000 years ago. The last several decades have witnessed a slight rise in sea level and combined with subsidence has resulted in acceleration of barrier island landward retreat and erosion. Beaches and barrier islands that receive active sedimentation in sufficient quantities can keep pace with the land drowning processes.

Concurrently with the disintegration of the barrier islands and widening of inlets, salt water is allowed to intrude well up into Louisiana's bays and estuaries. Salinity encroachment causes significant changes in the composition of marshes that affect wildlife and fishery species that inhabit particular habitats. The northward migration of oysters in the Barataria Bay, followed by their predators, the oyster drills, is an example of the effects of salinity encroachment. This predator thrives in waters with salinities of 15ppt and greater and its presence is found well up into the basin indicating the critical nature of salinity intrusion.

Comparison of Dr. Robert Chabreck's 1968 vegetation studies with his 1978 repeat survey reveals the effects of salinity encroachment that has occurred over the 10 year period.

240 sq. mi. of brackish marsh-converted to saline
352 sq. mi. of intermediate marsh-converted to brackish
282 sq. mi. of fresh marsh-converted to intermediate
29 sq. mi. of fresh marsh-converted to brackish

Louisiana barrier islands are significantly important as a buffer from storm surges, and protect the marshland-estuarine resource habitats from direct impact from the Gulf. They are likely the single most important reason that Louisiana possesses the highest productive environments in the nation. Without the barrier islands, the productive habitat niches would not develop as they presently exist. Without the liberty to initiate sand nourishment programs, the life of Louisiana barrier islands is numbered.

State of Louisiana
Department of Transportation and Development

David C. Treen
Governor

Paul J. Hardy
Secretary

Coastal Management Section
P.O. Box 44245 Capitol Station Baton Rouge, Louisiana 70804

S 2686 is aimed at protecting the barrier islands of the United States. The essence and intention of the bill is good. Barrier islands systems are an integral part of the coastal ecosystem and should be protected.

However, the bill lumps all barrier islands into a single group and emphasizes the curtailment of development as the best means of protecting the islands. S 2686 fails to recognize the difference between Louisiana's barrier islands and those of the Atlantic coast and consequently fails to address the primary problem facing Louisiana's barrier islands, the problem of sediment starvation.

Barrier islands are ephemeral coastal features that are in a constant state of flux. Their dynamic nature and form results from a balance between constructive and destructive marine processes which constantly move sediment on shore, alongshore and offshore.

The Atlantic coast barrier islands exemplify the classical barrier islands. Derived from continental slope sediment during periods of lowered sea level (Fig. 1), these islands act as energy dissipators in the coastal system. Over long periods, wave and wind energy is utilized to move sediments onto the barrier islands to increase their size and height. During storms, the destructive wave and wind energies are dissipated in removing this built-up sediment. After the storm, the cycle begins again (Fig. 2).

Islands maintain themselves and may increase in size due to sediment inputs from longshore drift and the shelf sediment.

A major cause of deterioration on these islands is development. The dynamic balance involving sediment relocation is interrupted in order to protect structures placed on the islands. Groins, jetties, bulkheads and other stabalizing structures all interrupt sediment movement and lead to excellerated island deterioration.

Curtailing development will help protect these classical type islands by maintaining the dynamic balance of sediment input and export.

Louisiana's barrier islands differ somewhat from the classical Atlantic coast type islands.

The entire coastal area of Louisiana has been formed by the deposition of riverine sediments from the Mississippi River. Through the past 6,000 - 7,000 years the Mississippi River has changed course many times, each time forming a large delta lobe (Fig. 3). After a channel is abandoned, the delta lobe deteriorates due to subsidence, wave action and other natural processes. Louisiana's barrier islands represent the reworked leading edges of these abandoned delta lobes. These islands are constantly reworked but little new sediment is introduced. There is some lateral introduction of sediment from other areas, but in general, the islands are deteriorating. This is illustrated in the Isles Denier - Timblier Island groups in Fig. 4 and 5.

Louisiana's barrier islands support little development. Grand Isle is the only island which supports any extensive residential and recreational development. The many other islands in the Louisiana system are primarily unsuitable for any type of development.

Measures aimed at curtailing development on these islands will do little to preserve them since sediment starvation is the major cause of deterioration. Some control of oil and gas activities on barrier islands will decrease the rate of deterioration, but only renewed sediment input can maintain them.

The LCRP has initiated several programs which are aimed at protection of barrier islands. During 1980, the Coastal Management Section will formulate special guidelines specific to activities on an effecting barrier islands. With this set of guidelines, the barrier island system will be named as a special management area in Louisiana. In addition to the protection aspect of the program, the LCRP is also formulating a freshwater diversion plan for Louisiana's coastal zone. It is hoped that these diversion plans, in conjunction with future sediment diversion, will address the primary problem of Louisiana's barrier islands--sediment supply.

Recommendations and Comments

1) Although the bill will do little to aid Louisiana islands, it makes good sense when applied to many Atlantic coast islands. Therefore, the bill should be supported in essence.

2) We feel that the state's coastal management program can do more to protect and preserve our barrier islands than the proposed federally run programs. Support should be given to State acquisition of these areas, rather than Federal acquisition. This would involve support of the Coastal Zone Management Act, especially Section 315.

3) One quarter of the potential revenue of the First Use Tax is earmarked for barrier island protection. This represents approximately 50 million dollars annually dedicated to barrier islands. I am confident that this represents a more sizable amount than would be committed by the NPS toward this effort. Much could be done in preserving our islands should this tax get through the legal hurdles.

4) The bill should be clearly worded so as not to hinder the states' coastal management sections in administering programs to protect and preserve barrier islands or curtail the funding of research efforts aimed at understanding natural processes active on barrier island systems.

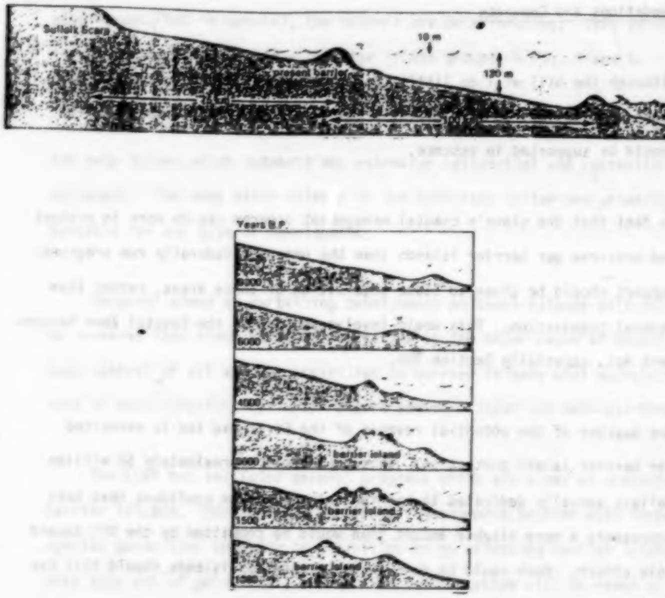

Suffolk Scarp
35 000 B.P.
Present
12,800 B.P.
10 m
120 m
present barrier
Years B.P.
6000
4000
barrier island
2000
barrier island
1500
barrier island

Figure 1. Historic variations in sealevel and evolution of classical barrier islands.

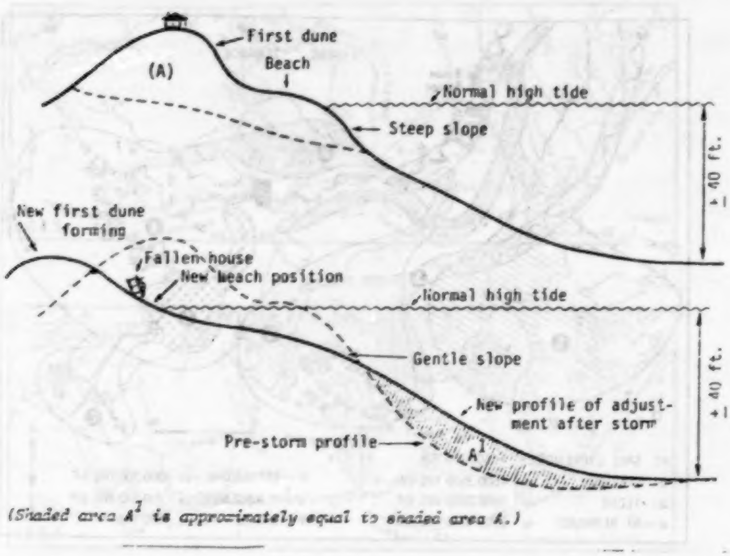
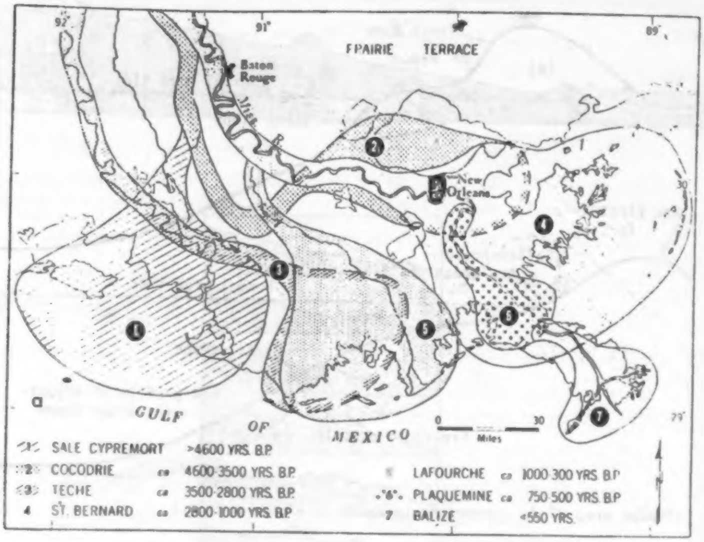

First dune
(A)
Beach
Normal high tide
Steep slope
± 40 ft.
New first dune forming
Fallen house
New beach position
Normal high tide
Gentle slope
New profile of adjustment after storm
Pre-storm profile
A'
± 40 ft.
(Shaded area A' is approximately equal to shaded area A.)

Figure 2. Beach morphology changes in response to storm energy. (From Pilkey et al., 1979)


92°
91°
89°
30°
29°
PRAIRIE TERRACE
Baton Rouge
Miss. R.
New Orleans
1
2
3
4
5
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7
a
GULF OF MEXICO
0
30
Miles
N
1 SALE CYPREMORT >4600 YRS. B.P.
2 COCODRIE ca 4600-3500 YRS. B.P.
3 TECHE ca 3500-2800 YRS. B.P.
4 ST. BERNARD ca 2800-1000 YRS. B.P.
5 LAFOURCHE ca 1000-300 YRS. B.P.
6 PLAQUEMINE ca 750-500 YRS. B.P.
7 BALIZE <550 YRS.

Figure 3. Historic delta lobes of the Mississppi River.

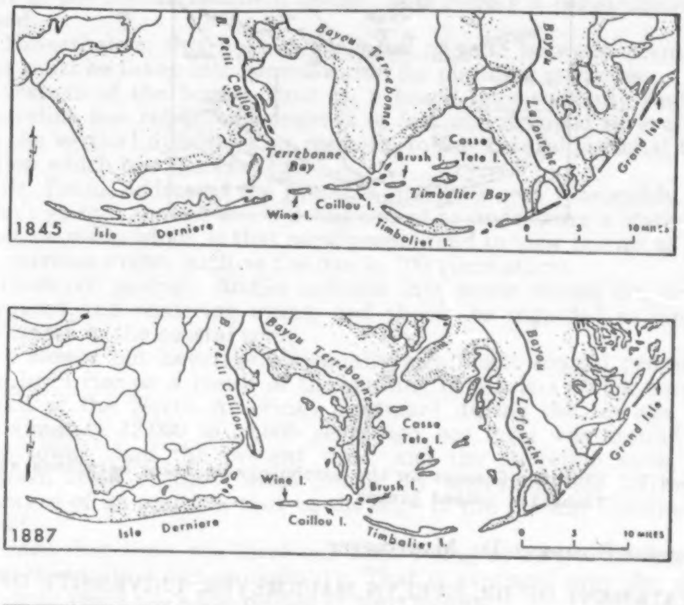

B. Petit Caillou
Bayou Terrebonne
Bayou Lafourche
Grand Isle
Terrebonne Bay
Brush I.
Casse Tete I.
Timbalier Bay
Wine I.
Caillou I.
Timbalier I.
1845
Isle Derniere
10 MILES
1887
Isle Derniere
1947
Isles Dernieres
E. Timbalier

Figure 4. Historic changes in Louisiana barrier islands and backshore areas

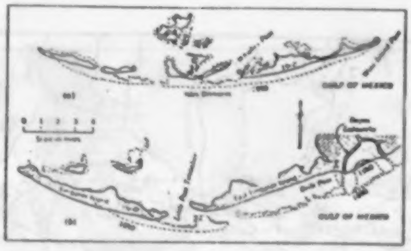


Figure 5. Historic Changes in the morphology of Isles Dernieres and Timbalier island groups.

Senator **Bumpers**. Dr. Maurmeyer.

STATEMENT OF DR. EVELYN MAURMEYER, UNIVERSITY OF DELAWARE

Dr. **Maurmeyer**. Thank you. I have been asked to testify on coastal processes and barrier island dynamics. This is a topic which can be addressed at great length, but I would like to make as concise a summary as I can.

With increasing pressure to develop barrier islands, there is an urgent need to understand barrier island dynamics so that these important and valuable natural resources can be properly managed.

It must be recognized that barrier islands are not stable environments. Their position shifts constantly in response to interactions among wave activities, storms, sea level rise, and sediment supplies.

It is also necessary to consider how human activity may alter natural shoreline processes and coastal configuration so that the impact of development may be accurately assessed.

Wave action results in movement of beach material from the onshore, offshore, and along shore directions, typically measured in volumes of hundreds of thousands of cubic yards per year. There is a constant interchange of sand among various coastal environments—the beach, dunes, backshore areas, offshore areas, and tidal shoals. The loss of sand from one part of the beach is simply to gain sand in another part.

For example, seasonal changes in wave climate often result in removal of the sand from the berm, the merging portion of the beach, and deposition of this material in a submerged offshore bar. To the casual observer, this may appear to represent beach erosion, but in the overall sediment budget, it is merely a redistribution of sand.

Nevertheless, this normal exchange of sand between berm and bar must be taken into consideration for planning purposes.

Owners of the houses built on a beach may suddenly find the shoreline has retreated hundreds of feet and dropped several feet in the vertical dimension in response to the natural seasonal transition which beaches undergo.

Dr. Frank addressed the problem of storms very thoroughly, so I won't go into that in much detail except to underscore a statement that he made which is that most people tend to view storms as rare or extreme events such as the one in 100 years storm.

However, geologic studies indicate that storm events are indeed frequent and recurring events and should be regarded as normal processes in the coastal zone.

A slower but nevertheless equally significant coastal process is sea level rise as a result of the melting of glaciers which covered much of the North American Continent during the ice age. Approximately 12,000 to 14,000 years ago, sea level was around 400 feet lower than the present time, and the shoreline along the eastern coast of the United States lay approximately 100 miles seaward of its position, that is, the edge of the present Continental Shelf.

Since that time, sea level has been rising at long-term rates of approximately 3 feet per century. That is averaged over the thousands of years since the retreat of the glaciers.

However, the indications that we have from even the short-term data such as tide records indicate that sea level rise is continuing. Tide records from various cities along the eastern gulf coast show an annual increase in water level of 1.2 to 9.8 millimeters per year, or an average of about 1 foot per century.

There is potential for an additional 300-foot rise in sea level should all the polar ice caps melt. How will barrier islands respond to this rise in sea level? The response is that the barrier islands migrate landward and upward as sea level rises.

Rates of landward migration are extremely variable, but an average figure is on the order of several hundred feet per century. Rates of vertical accretion are generally on a level equal to that of sea level rise, say on the order of a foot per century vertical erosion.

The dominant process by which this landward and upward migration of barrier islands occurs is called overwash. In this process storm waves and hurricane surge transport sand across the beach and the barrier islands, resulting in the landward accretion of the barrier island system as an entire unit.

In this process then, the barrier islands can keep pace with sea level. It continues to accrete vertically as sea level rises, as well as lateral migration, so material lost from the seaward margin simply transfers to the landward margin of the barrier islands, maintaining its dimensions throughout time.

Overwash is frequently considered destructive by homeowners and efforts are devoted toward prevention in developed areas to prevent structures from flooding by storm waters and from barrier island sand.

In the long-range overall scheme of barrier island dynamics, this is a self-defeating strategy as the inhibition of overwash leads to continuing narrowing of the barrier islands from the seaward side, and no accretion on the landward side. In fact, a study by Dr. Robert Dolan of the University of Virginia on the outer banks of North Carolina shows that Hatteras Island has narrowed considerably since the construction of artifically high dunes which inhibit overwash, whereas coral banks, natural barrier islands, have maintained their dimensions more or less by the overwash process which has been allowed to continue.

In order for barrier islands to continue to exist in the face of constant wave activity and sea level rise, there must be adequate supplies of sediment to reach the shoreline to maintain the barrier islands. Beaches can receive new material via rivers, glaciers, cliff erosion, and even from the production of carbonate material by marine organisms such as coral reefs or mollusks.

Human intervention may cut off the sand reaching beaches. For example, dams constructed across rivers will tend to compound sediment that would normally reach the coastline. The construction of bulkheads or abutments to protect dunes will remove that as a source of material.

Also activities such as dredging or increased agricultural utilization of coastal areas may cause sedimentation of the near-shore water, inhibition of marine life, cutting down on the biological productivity of potential beach sand.

Another source of sand to the beach is the beach itself. As I mentioned, overwash supplies sand to the backshore area. Longshore currents, tide currents redistribute sand in the system itself. Structures may result in the reduction of sediment which is redistributed along the barrier islands, resulting in accelerating rates of erosion.

For example, in Indian River Inlet, a tidal inlet along the Delaware coast, this particular inlet was stabilized in 1939 by rock jetties. Prior to the construction of the jetties, the rate of erosion on this beach was 7 feet per year. Following the construction of jetties, the longshore transfer of sand was inhibited. The downward shoreline, starved for sediment, increased its rate of erosion to over 21 feet per year. The rate of erosion tripled as a result of structures reducing the sediment available to the beach.

These are just a few examples where activities and development can result in the acceleration of beach erosion far beyond those observed under natural conditions.

In conclusion, I would like to stress the following points. Barrier islands are unstable environments constantly shifting in position in response to the interaction between coastal processes and sand supply.

There is a constant change of sand among barrier environments and the overall result is that barrier islands are migrating in a landward direction.

We can expect these processes to continue, and although coastal change may be predicted to some degree, we must recognize the fact that the position of the shoreline will change and that we must adapt to this change.

The most effective way to do so is to allow barrier island migration and coastal change to take place and to discourage further development of barrier islands.

Thank you.

Senator **Bumpers**. Thank you both very much. As I say, I am trying to get through with this hearing today with the knowledge that we have got some votes coming up.

I simply thank both of you for excellent testimony.

Mr. **Behrhorst**. I am not sure—Senator Long's assistant handed me a statement by Senator Long. I wasn't sure whether I was supposed to submit that.

Senator **Bumpers**. We will submit that for the record and be pleased to receive it.

Thank you very much. Thank you both.

[The prepared statement of Senator Long follows:]

Statement of Hon. Russell B. Long, a U.S. Senator From the State of Louisiana

I regret that my schedule prevents me from personally appearing before your Subcommittee to express my concern about S. 2686. The destruction caused by Hurricane Frederick called into question continuing development on our Nation's barrier islands.

I do not question the need for some action. I do, however, believe that this bill is not the appropriate way to resolve the barrier island question in my state, Louisiana. The state of Louisiana is submitting detailed testimony which I am sure you will give careful consideration.

Natural forces cause changes in Louisiana's coastline. Over the last several hundred years, the Louisiana coast has been rapidly retreating. As representative of the people of Louisiana, I cannot support any legislation that would prohibit the state's efforts to reverse or mitigate this deterioration. Louisiana's barrier islands are a protection for our valuable estuaries and the boundaries of our state. The barrier islands themselves must be protected if they are to continue to serve as the buffer for the rest of the state.

In addition, you and most of our colleagues are well aware of the importance of the Tidelands case. The Supreme Court decision established that Louisiana's coastal boundary is "ambulatory" and therefore, subject to modification by the Court. If Louisiana is prevented from guarding against further coastline erosion, the very boundaries of our state, as well as ownership of the water bottoms of our bays and estuaries, will be adversely affected.

Louisiana's barrier islands are an important center of energy development particularly in the productive outer continental shelf. While this bill does exempt "energy related activities," it does leave some question about what would be included under this term. In light of our current energy problems, any action which would jeopardize domestic production seems counterproductive.

To handle this problem at the state level, the Louisiana Legislature has passed legislation to require monitoring of the location and movement of our barrier islands and establishing demonstration projects to find ways to stabilize within Louisiana's Coastal Zone Management Program.

Mr. Chairman, you and your colleagues have been sensitive to the special problems that this legislation would create for my state. If your committee feels that this proposal is in the best interests of the rest of the Nation, I strongly urge you to exempt Louisiana from this bill. The effect that S. 2686 would have on Louisiana cannot be acceptable to the state or to me, as its senior Senator.

Senator **Bumpers**. Our next two witnesses are also a panel—Mr. David Jones, National Association of Realtors in Naples, Fla.; Mr. Fred Napolitano, National Association of Home Builders from Virginia Beach, Va.

Gentlemen, if you will please try to summarize what you have to say for us—Mr. Napolitano is getting to be an old hand at this.

STATEMENT OF DAVID JONES, NATIONAL ASSOCIATION OF REALTORS; ACCOMPANIED BY THOMAS C. FRANKS, DIRECTOR, ENVIRONMENT AND ENERGY AFFAIRS, NATIONAL ASSOCIATION OF REALTORS, NAPLES, FLA.

Mr. JONES. I want to thank you for allowing me to appear here today. First, let me say I am from Naples, Fla., which is about 150 miles south of Tampa.

Senator BUMPERS. I know all about Naples, Fla.

Mr. JONES. It is a beautiful little community. We have five of these barrier islands listed within 20 miles of Naples on either side. I have lived in that community for over 40 years, and have had a chance to see and work with these islands and enjoy them through the years.

On behalf of the National Association of Realtors, I am here today. We represent 730,000 members throughout this country. I am assisted here by Mr. Tom Franks, our director of environment and energy affairs for the National Association of Realtors.

I would like to say that we are not here as a bad guy today. We are vitally concerned with the barrier islands throughout this Nation. We are concerned about saving lives. We are concerned about the environment that exists on these islands.

We are also, though, quite interested in the right of private ownership of people who own property on these islands and how they may be affected by this legislation.

We feel that there are several things in this act that I would like to go over with you that concern us. One is the very minor item of system maps which have been put out. We feel that these should be more in detail. They should show the elevations of these islands that exist as well as the assessed valuations of these lands that are located on these islands because this is going to have a definite economic effect on the communities that exist in those areas and the counties in that area.

One thing that we are quite concerned about is a clear omission in the legislation of the lack of any review or appeal process for local communities and individuals who feel for various reasons adjustment or deletions of regulations are necessary.

Under the Federal flood insurance program, a local review mechanism has proven essential to the successful operation of this program. In fact, we believe failure to do so will arouse much consternation among affected parties.

The National Association would also like to see more indepth study and evaluation of the barrier island situation before congressional action is taken. We realize that some islands may be unsuitable for development, and in fact would be more of an expense to the Federal Government than a contributor to the economy. Others, however, are vital units of State and local as well as Federal economies, providing unique residential, recreational, and commercial opportunities.

We would like to see a definitive, objective economic analysis done on all the barrier islands in question before congressional action commences.

The economy involved in this is of much concern to us. We are concerned over which islands will actually be affected by S. 2686. Realtors are compelled to object to the mechanism for conserving land resources outlined in this legislation, that is, withholding of Federal expenditures for insurance as well as permits, licensing, et cetera, for construction or beach stabilization activities within the barrier islands.

This would be penalizing private property owners whose only crime is wanting to own property and live in one of the most beautiful parts of our country. These regulations will surely decrease the economic value of these islands thereby causing financial harm to thousands of owners.

In addition, the effect on local tax rolls could be significant and should be analyzed for our further consideration of this legislation.

If significant barrier island resources are to be protected, we strongly recommend that the Federal Government actually purchase these areas. If private property owners are to be threatened by prohibitions on virtually all forms of development, we feel the only fair way is to have a condemnation procedure established to where these people would receive a fair consideration for their investment and could move elsewhere and resettle.

Each of the States that are involved in this have many regulations. Florida has adopted a great many regulations regarding coastal setbacks, and protection of wetlands. It is practically impossible now to develop any wetlands in Florida and I am glad that this is so because it is in the public interest.

I don't know how far we have gone in analyzing the protection now being offered by all of the various States involved. I think a compilation of the various regulations and the exact restrictions that have been placed on these properties should be considered in the overall master plan for consideration of this act.

Looking at the overall picture, we find that approximately 39 percent of the barrier islands now are in either Federal, State, or local ownership.

Senator BUMPERS. Almost 40 percent?

Mr. JONES. Almost 40 percent of these lands that are under consideration are already owned by the Federal Government or State and local entities, so we feel this is a significant amount and certainly we would be a long way if we proceeded on the condemnation matter to protect certain of these islands that need to be protected.

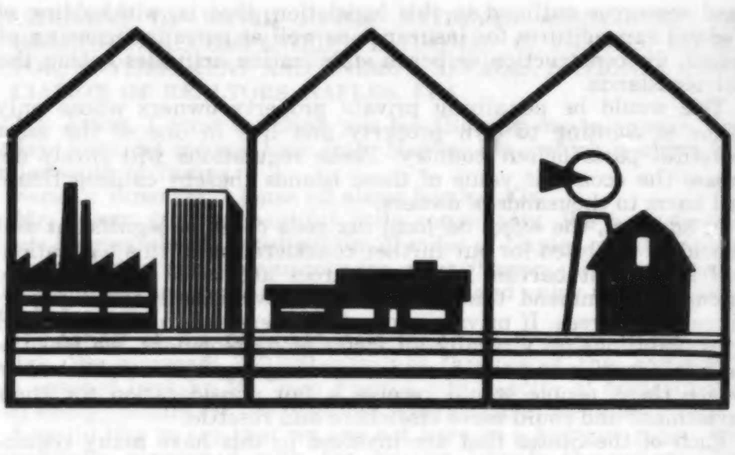
In summary, we would urge that the whole proposal be analyzed as to economic effect on the people involved and the communities that exist in those areas.

I don't have any further statement particularly to make.

Senator BUMPERS. Thank you very much.

Mr. JONES. Thank you.

[The prepared statement of Mr. Jones follows:]



Statement of the
NATIONAL ASSOCIATION OF REALTORS®

TO THE: SUBCOMMITTEE ON PARKS, RECREATION AND RENEWABLE RESOURCES
OF THE SENATE ENERGY COMMITTEE

ON: S. 2686, BARRIER ISLANDS LEGISLATION

BY: DAVID JONES

DATE: JUNE 12, 1980

My name is David Jones. I am a REALTOR® from Naples, Florida. I am here representing over 730,000 members of the NATIONAL ASSOCIATION OF REALTORS®. Accompanying me today is Thomas C. Franks, Director of Environmental and Energy Affairs of the NATIONAL ASSOCIATION OF REALTORS®. We appreciate the opportunity to appear here today to comment on legislation (S. 2686) which is pending before you to provide protection for the Barrier Islands of the United States.

In reviewing S. 2686, our Association is concerned over the lack of an adequate foundation for the legislation. The "Barrier Islands Protection System" maps which are used to define those undeveloped barrier islands which will be subject to the bill's protective measures depict only vague, poorly defined boundary lines and a sketchy description of the areas. To those persons with an interest in the future of barrier island development these maps would demonstrate very little as to the effects on property lines and community resources. In that we are potentially affecting the land values of thousands of private property owners and many communities in this legislation, we firmly believe the least that can be done is to provide detailed maps showing exactly how an individual property owner would be affected in and around the barrier island unit.

A clear omission in this legislation is the lack of any review and appeal process for local communities and individuals who feel for various reasons adjustments or deletions on the maps are necessary. Under the Federal Flood Insurance Program, a local review mechanism has proven essential to the successful operation of that program. In fact, we believe failure to do so will arouse such consternation among affected parties that it could cloud the entire future of this legislation.

The NATIONAL ASSOCIATION OF REALTORS® would also like to see more in-depth study and evaluation of the barrier island situation before Congressional action is taken. We recognize that some islands may be unsuitable for development and in fact would be more of an expense to the federal government than a contributor to the economy. Others, however, are vital units of state and local (as well as federal) economies providing unique residential, recreational, and commercial opportunities. REALTORS® who live and/or work in these areas are quite puzzled by Congressional attempts to halt further island development since their areas' claims on federal funds are much less than their tax revenues and economic benefits. We would like to see a definitive, objective economic analysis done of all the barrier islands in question before Congressional action commences.

Further study is also necessary in the area of preservation criteria. Section I, Subsection 2 of the bill makes the general statement that "the barrier islands are generally unsuitable for development". We question the existence of development or lack thereof on barrier islands as the sole criterion for inclusion in this legislation. Although we strongly support excluding developed islands from the legislation across the board, numerous other factors should be weighed before contemplating the withdrawal of all federal insurance and assistance on undeveloped islands. The simple fact is, Mr. Chairman, not all undeveloped islands are identical and therefore should not be treated identically under this bill. It was interesting to note the testimony of one geologist before the House committee who stated that the surface of some barrier islands has not changed substantially in decades. In fact, this geologist declared that development of these islands would pose no significant risk to surrounding areas or to the islands themselves.

One effort to study the barrier islands situation which is currently under way is the National Environmental Policy Act process. This process will, of course, eventually lead to a final environmental impact study. The information provided by this analysis will be valuable in formulating any barrier islands policy. We therefore urge the committee to withhold legislation until that process is completed.

Mr. Chairman, aside from our concerns over which barrier islands will actually be affected by S. 2686, REALTORS® are compelled to object to the mechanism for conserving island resources outlined in the legislation, i.e., the withholding of federal expenditures, insurance, as well as permits, licenses, etc. for construction or beach stabilization activities within defined barrier island areas. For many property owners, the barrier island areas would never have been attractive acquisitions without the potential for federally-assisted insurance and other federally related programs -- just as property throughout the country is enhanced and made "purchasable" through government assistance, loan guarantees and insurance programs. Inevitably many landowners who settled in the barrier islands on the assumption of availablity of federal programs will be prohibited from initiating any new building or construction activity which may be needed or desired. The retroactive nature of the financing prohibition is especially unjust when reviewed from the perspective of landowners in the "undeveloped" barrier islands. These owners would suffer real property value losses as a result of the federal withdrawal with no compensation.

If significant barrier island resources are to be protected, we strongly recommend that the federal government actually purchase these areas. If private property owners are to be threatened by prohibitions on virtually all forms of federal assistance and insurance and thus experience indirect condemnation of their property, we strongly urge that the legislation provide for outright acquisition through conventional condemnation procedures. The property owner would suffer most under the condemnation of his or her land through cutoffs in federal assistance which would detract from the land value for any subsequent resale and would offer no compensation. Acquisition through condemnation would offer the landowner a fair price for the land with flexibility to relocate, purchase new land, etc. Furthermore, acquisition is the only sure way to guarantee absolute protection of areas deemed environmentally or geologically unsuitable for development.

In summary, we would urge that the whole proposal be rethought and that a more selective and refined approach be taken on what is truly an important issue, i.e., the development of an even-handed barrier island policy. We appreciate this opportunity to appear before your subcommittee to express our views on the barrier islands legislation and look forward to working with you on this issue.

The NATIONAL ASSOCIATION OF REALTORS® is comprised of more than 1,806 local boards of REALTORS® located in every state of the Union, the District of Columbia, and Puerto Rico. Combined membership of these boards is over 730,000 persons actively engaged in sales, brokerage, management, counseling, and appraisal of residential, commercial, industrial, recreational and farm real estate. The activities of the Association's membership involve all aspects of the real estate industry, such as mortgage banking, home building, and commercial and residential real estate development, including development, construction and sales of condominiums. The Association has the largest membership of any association in the United States concerned with all facets of the real estate industry.

Officers are: Ralph Pritchard, President, Oak Brook, Illinois; John R. Wood, First Vice President, Naples, Florida; James L. Helsel, Treasurer, Harrisburg, Pennsylvania.

The Chief Executive Officer is Jack Carlson, Executive Vice President and Chief Economist.

The Senior Vice President, Government Affairs is Albert E. Abrahams and the Vice President & Legislative Counsel, Government Affairs is Gil Thurm.

Headquarters of the Association are at 430 North Michigan Avenue, Chicago, Illinois 60611. The Washington office is located at 925 15th Street, N.W., Washington, D.C. 20005. Telephone 202/637-6800.

REALTOR®

Senator BUMPERS. Mr. Napolitano.

STATEMENT OF FRED NAPOLITANO, VICE PRESIDENT AND TREASURER, NATIONAL ASSOCIATION OF HOME BUILDERS, WASHINGTON, D.C.; ACCOMPANIED BY ROBERT BANNISTER, SENIOR STAFF VICE PRESIDENT FOR GOVERNMENT AFFAIRS, AND SCOTT SLESINGER, ASSISTANT LEGISLATIVE COUNSEL

Mr. NAPOLITANO. Thank you, Mr. Chairman. I am glad to be back with you again. As you know, I am a homebuilder from Virginia Beach, Va., and I am testifying today on behalf of the more than 124,000 members of the National Association of Home Builders, of which I am vice president and treasurer.

Accompanying me is Robert Bannister, senior staff vice president for government affairs, and Scott Slesinger, assistant legislative counsel.

For the sake of time, I would like to submit our full testimony and I will try to just give you a brief version of it.

Senator BUMPERS. We would appreciate that. Your full statement will be admitted into the record.

Mr. NAPOLITANO. We agree with the premise of the bill that barrier islands can be fragile ecosystems in need of protection. Certain islands are too variable to withstand development. Others are stable and less prone to environmental dangers compared to some mainland development.

However, the bill is unnecessarily broad. All undeveloped islands are made ineligible for Federal assistance, permits, licenses, or flood insurance.

NAHB believes islands that should be restricted are those that are, one, in significant danger; two, that have significant natural resources; and three, that cannot support structures that can withstand storm surges.

There is an unprecedented delegation under this bill of congressional authority to administrative agencies. The maps have not been subject to review by the local landowners. We believe that landowners should be given the opportunity for a hearing to question the conclusions of the department.

We question whether there should be broad restrictions denying all Federal assistance for construction of any structure, facility, or related infrastructure. We believe that a cost/benefit analysis which is now common in environmental laws and is being considered in numerous regulatory reform bills should be completed instead of the very arbitrary denial of all Federal assistance.

We believe that if the Federal Government is going to restrict private property for the benefit of the population at large that takes away the economic value, it has an obligation to pay for this benefit.

The Constitution requires that private property not be taken without just compensation. Instead of purchasing the property, this bill makes development very difficult. We believe that the Federal Government should purchase the islands if it truly believes that all development whether federally assisted or nonfederally assisted should not occur.

Mr. Chairman, for the reasons outlined above, we ask for changes in this legislation and would be pleased to work with your staff to accommodate this and any problems we have brought to your attention.

Thank you.

[The prepared statement of Mr. Napolitano follows:]

National Association of Home Builders
15th and M Streets, N.W., Washington, D.C. 20005
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STATEMENT OF
THE NATIONAL ASSOCIATION OF HOME BUILDERS
before the
UNITED STATES SENATE
COMMITTEE ON ENERGY & NATURAL RESOURCES
SUBCOMMITTEE ON PARKS, RECREATION AND RENEWABLE RESOURCES
on
BARRIER ISLAND LEGISLATION
June 12, 1980

My name is Fred Napolitano and I am a homebuilder from Virginia Beach, Virginia. I am testifying today on behalf of the more than 124,000 members of the National Association of Home Builders (NAHB). Our members employ 3 million workers. NAHB is a trade association of the homebuilding industry of which I am Vice President and Secretary. Accompanying me today are Robert D Bannister, Senior Staff Vice President for Government Affairs and Scott Slesinger, Assistant Legislative Counsel.

We agree with the premise of S. 2686 that barrier islands can be fragile ecosystems in need of protection. Certain islands are too variable to withstand development. Others are stable and less prone to environmental dangers compared to some mainland development. However, we must oppose the unnecessary scope of this proposed legislation as well as the virtually unlimited discretion given to administrative officials over the property of private citizens.

The heart of the bill is Section 3 entitled "Conservation of Barrier Island Resources." That section provides that Federal expenditures or financial assistance under Federal law, license or permit will not be approved for any undeveloped barrier islands and undeveloped portions of barrier islands identified in a map already prepared by the Secretary of Interior.

The criterion in this bill for cutting off Federal funds only takes into account the present amount of existing development on the island. If the parcel is undeveloped, all forms of Federal assistance are completely restricted. S. 2686 fails to distinguish among the islands as to their suitability for development and their level of hazardousness. The bill clearly states that any and all undeveloped islands or undeveloped parts of developed islands cannot receive necessary Federal funds for development regardless of the island's physical characteristics or its susceptibility to natural hazards. Even the Secretary of Interior's report "Undeveloped and Unprotected Barrier Islands of the United States," which is cited in the bill as the source of the islands for inclusion, rates the islands as to their suitability for development and the significance of their natural resources. We believe that only where it can be shown that an island is (1) in significant danger; (2) that it has significant natural resources; and (3) that it cannot support structures that can withstand storm surges, should the broad Federal restrictions contemplated in this bill be applicable.

We are quite concerned with the unprecedented discretion given the Department of Interior (DOI) in this bill. For instance, the main criteria that the island be undeveloped, is undefined. The background report accompanying the Department maps considers one permanent structure per five acres as developed and all islands with less than a quarter mile of beach are excluded from consideration. However, the Secretary's criteria can change at any time without review. The Secretary's report itself says that "any system for classifying barrier islands must be developed in accordance with carefully specified objectives." However, such classifications should be set by statute and not be subject to the unbridled discretion of an administrative official.

The Secretary's discretion only begins with the definition of "undeveloped." Under this bill, all undeveloped islands on the maps of the Department of Interior are restricted from Federal assistance. Although this is an in-house document that has not been subject to public comment and review, these maps are given the status of a statute by their inclusion by reference in Section 3(a). I believe this is an unprecedented delegation of Congressional authority to an administrative agency. There is no protection to aggrieved communities. Many of the maps are vague, making landowners uncertain of their status. In addition, many people purchased lots relying on local zoning and subdivision plots that were ignored by DOI.

We must remember that restricting Federal assistance, such as FHA insured mortgages, could make the landowner's property worthless. We strongly believe that there should be a specific finding that a particular island requires the restrictions contemplated in the bill and the review process should give the private landowners the opportunity for a hearing. Such a hearing would give the affected landowners some semblance of due process. This process is normal procedure. For instance, under the flood insurance statutes, the Federal government makes a determination that a 100 year floodplain is necessary to protect the population. If a particular community questions the accurateness of the maps, it has the right to an administrative hearing or appeal to the Administrator of the flood insurance program to determine whether the 100 year floodplain has been correctly drawn. A similar hearing should be required under this legislation.

Thirdly, we question the broad restrictions in Section 3(b) that would deny all Federal assistance for construction of any structure, facility or related infrastructure. Such a broad restriction could cause or create more environmental problems than allowing the Federal facility. This could have an especially profound effect on islands that are only partially undeveloped. For instance, construction under the Sewage Construction Grant program of the Environmental Protection Agency would not be allowed under this bill. However, barrier islands, traditionally made of sandy soil, are inadequate for alternative treatment systems such as septic tanks. This could encourage the dumping of raw sewage into the bays and oceans. We urge the Congress not to restrict Federal actions unless there is a weighing of the benefits and the costs. Such a cost/ benefit analysis is common in environmental laws and is being considered in numerous regulatory reform bills. In an analogous statute, the Safe Drinking Water Act restricts Federal assistance above certain underground drinking water supplies after a cost/benefit determination. We urge this Committee to include such protection in this bill.

The major distinction between the bill before this Committee and the House bill (H.R. 5981) introduced by Congressman Philip Burton, is that H.R. 5981 uses Federal funds to purchase undeveloped barrier islands for permanent protection. This bill, with an eye on the Federal budget, attempts to protect the islands for the public by restricting landowners so that development is impossible. The United States Constitution requires that private property not be taken without just compensation. We believe that if the Federal government is going to restrict private property for the benefit of the population at large, to take away its economic value, it has an obligation to pay for this benefit. In the Supreme Court case of Pennsylvania Coal v. Mahon, in 1922, Oliver Wendell Holmes wrote:

> "the general rule at least is while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking ... We are in danger of forgetting that a strong public desire to improve the public condition is not enough to warrant achieving the desire by a shorter cut than the Constitutional way of paying for the change."

This principle was again endorsed by the Supreme Court in 1978 and 1979.

For the reasons outlined above, we must oppose this legislation because of its disregard for private property rights. However, we would be pleased to work with your staff to try to overcome the shortcomings we have mentioned.

Thank you for the opportunity to present our views. I will be happy to answer any questions.

Senator Bumpers. Thank you very much. If you would both be kind enough to submit to us the specific changes that you would like to see made, certainly your point about acquiring the islands and the economic adversity that property owners would suffer as a result of this legislation is well taken.

The House bill provides that. My own thought is that the cost of a bill of that nature would be just staggering, yet we do have to take into consideration the rights of people who own these islands and who have an economic interest. They have a right to be protected in that interest.

What we are probably going to wind up doing is trying to balance this legislation so that they will not be unnecessarily hurt economically but at the same time offer protection to these islands. Obviously it is a very delicate trick but what we are trying to do is to save both some of the estuarines and islands themselves from development that just ought not to be developed, and No. 2, the staggering cost that the United States may face if it continues to write flood insurance for the continuing development of these islands. So it is a two-pronged sword that we are trying to get at here, and yet for myself and I know I speak for other members of the committee, we don't want to cause any economic burdens on these people without full compensation.

If you will submit specific suggestions, I think your point about the maps, that has been made over and over this morning—I intended if I had more time to get into that with the administration. I wanted to ask them about the sufficiency of these maps. They are obviously deficient in some ways and we do need a correct map.

We will welcome your specific suggestions as to changes in the legislation.

Mr. Jones. On the condemnation, we got into a problem with the Everglades National Park years ago.

Senator Bumpers. What was that?

Mr. Jones. When they first bought up the Everglades National Park back in the late 1940's, and I served on some of the committees and in the Florida House of Representatives. Back in those days the Federal Government was entitled to purchase these lands. They did purchase all but about 20,000 acres and left them in the center. These people were cut off, not allowed to use their land, had to pay taxes on them, and they refused to purchase those up until 1970.

It left a real bitter taste in a lot of people's mouth. My point is the right to condemn is one thing. The actual authorization of condemnation is another. I think probably one of the things that might be considered is, for example, Florida recently set aside $100 million to purchase areas of critical State concern, those that are environmentally sensitive which we have done in Florida through a bond issue.

Now there are various people involved that pick the selective properties that were to be purchased. Maybe that would be a method, that a certain amount of funds be set aside and then those most endangered outer islands be purchased in that order.

Senator Bumpers. One of the most heartbreaking lawsuits that I lost was on behalf of a homeowner. A freeway, part of the interstate system through town, one of those bypasses, didn't take a foot of his property, but the effect of it was to cut the value of his home in about half, and he obviously suffered severe economic loss, but the Supreme Court ruled if we went that far, there was just no end to how far you could carry the theory, and I lost the lawsuit even though that man obviously suffered a tremendous loss to the value of his property.

I thank you both very much for being here this morning. Our next panel is Mr. Walter Kaufman, Heartwood Realty, Inc., and Mr. H. Crane Miller, Shaeffer & Roland, Inc., Washington, D.C.

Do we have one of the witnesses missing this morning? Which one are you?

Mr. **Miller**. I am Crane Miller.

Senator **Bumpers**. Mr. Miller, apparently Mr. Kaufman is not here, so please proceed.

STATEMENT OF H. CRANE MILLER, VICE PRESIDENT AND GENERAL COUNSEL, SHAEFFER & ROLAND, INC.

Mr. **Miller**. Mr. Chairman, thank you very much for this opportunity to speak on this very important legislation. Just in summary, I recall when I used to have a position comparable to Mr. Kutler's with the economy committee and I always found you had about 3 minutes of time to get a point across, and I will take slightly longer than that, but just not too much longer.

We made three recommendations. One relates to enactment of this legislation. We also recommend acquisition authority such as Mr. Jones was just talking about, and the third recommendation makes a recommendation with regard to flood insurance provisions in the bill.

The first recommendation on enactment of the provisions of S. 2686, that would prohibit the Federal expenditures and financial assistance for infrastructure facilities for access to barrier islands and structures for shoreline stabilization on the undeveloped, unprotected islands, barrier islands, we think that ought to be enacted.

Senator **Bumpers**. You are saying you agree with that part of it?

Mr. **Miller**. That part of it, yes, and that would be a very important contribution.

In this century the Congress has used three basic strategies for dealing with flood losses. At the early part of the century it was a laissez-faire approach. If you developed on the flood plain and you had a loss, that was your loss.

Then the Congress switched in 1936 and you assumed a national responsibility for flood structures that still continues, but our annual average losses have been mounting, nevertheless.

The third strategy came with enactment of the flood insurance program, and that was a shift away from a structural approach for dealing with flood losses and dealt more with a nonstructural management aspect, and your principal vehicle for doing that is the national flood insurance program, and the point we will be making here is despite the shortcomings, and there are shortcomings, it is early to be talking about the demise of the flood insurance program.

There is a problem with the approach of S. 2686, and that is that it will not prevent development. It will delay it. It will shift the timing, but as long as private financing is available for development, they will ultimately come in. The demand is there for the development, and there will be private financing. S. 2686 will not reach that.

For that reason, our second recommendation is that you do have acquisition authority that is similar to that that is in the House bill, H.R. 5981. Mr. Jones had I think a very cogent reason there, and you responded very well to it in your own personal experience, that if you have people there who are going to be impacted by it, they made an investment and now they find they can't get out of that investment, or are going to take a loss, that seems basically unfair, and we feel that the acquisition ought to be there.

Now in our full statement, we would like to submit for the record, we have an analysis that first looks at what we are talking about on the unprotected, undeveloped islands.

The acreage is approximately 484,000 acres. Two-thirds of that, about 306,000, are made up of wetlands, and 160,000 acres are developable for fastlands, and we have made an analysis here of what we feel it would cost using current Federal programs to develop those islands as against the cost of acquisition.

Our paper then summarizes those costs and let me just very briefly read them into the record if I may. Total cost to participate in the development of those 160,000 acres—previously in the House we had testified with regard to 480,000, but with more refined information that we have obtained since we testified there, we can now focus in on these fastlands and assume that either through regulation or through other purchases that the wetlands will not be developed, but our total shows that over $4 billion would be the Federal share to participate in the development of those 160,000 acres on that, and that is on 63 islands.

Of them, $1.2 billion would be for sewers and waste water treatment; $0.68 billion for water supply; $1.1 billion for roads and for bridges; $0.42 billion for disaster relief; $0.25 billion for flood insurance; and $0.47 billion for shoreline and harbor maintenance flood control structures. That is a total of $4.13 billion.

Senator **Bumpers**. Is that outlined in your formal statement?

Mr. **Miller**. Yes, sir. They are, expressly, and the means by which we derived that.

We estimate that the Federal cost to purchase in fee simple 100 percent of the 160,000 acres of the undeveloped, unprotected fastlands would be about $800 million. Now the way I arrive at that figure is that I took all of the purchases of land in the national seashores from the late 1970's and I came up with an average cost per acre of $4,890. I rounded that off to $5,000 an acre, multiplied times 160,000. That is a good, sound present value for, an average figure for the cost to acquire those fastlands.

What we are saying here is that in terms of Federal costs, it would be 5.2 times as costly for you to participate in the development of those islands than it would be to acquire them, and frankly, some of the other figures that were thrown around here today, $800 million, looks like mighty small in comparison.

Our third recommendation, Mr. Chairman, is that you delete the section or subsection 3 of section 3(b). That is the portion that relates to the flood insurance program.

Now there are several problems. One, I feel that the language itself as written doesn't accomplish what it appears to want to do, but despite that, the point is that our analysis shows that only 6 percent of the current program's approach to the development of barrier islands would be attributable to the flood insurance program, but another 83 percent is attributable to our Federal subsidies for bridges, roads, water supply and waste water treatment, and I think that in terms of all the studies that I have done on the coast, that that is the type of leverage that is going on, that you can attribute the influence of development primarily to your ability to have access to the islands and then you put in a sewerline and water supply and you have now the basic needs for the development of a community, and that is going to have far more influence than the flood insurance program itself which deals only with insurance on housing and construction.

Senator **Bumpers**. That is an excellent point.

Mr. **Miller**. We feel that the Congress was wise in turning the strategy on flood loss reduction toward nonstructural management. Your principal tool for doing that, your principal regulations for doing that are in the national flood insurance program.

Ms. Jimenez spoke this morning about the changes that she is making in the regulations there. They are very definitely strengthening their regulations, and they will have an impact to reduce flood losses. I am convinced of it.

Moreover, one of the principal authorities for acquiring land is in the national flood insurance program right now. I'm sorry Senator Tsongas isn't here, but I understand one of the first exercises of the authority under section 1362 is going to be considered at Massachusetts. It is an area that was devastated by a winter storm in February of 1978, and there are some houses that were just literally wiped off the face of the beach in that storm, so for these reasons, we feel that you should affirm the national flood insurance program, that the principal thrust that you have that will be effective is in the removal of the Federal subsidies for the bridges, the roads, the water supply, the waste water treatment, that is an enormous contribution to the authority here.

You couple that with the regulatory acquisition authority of the national flood insurance program, and add to it acquisition authority, and you have yourself a super bill.

Thank you, sir.

Senator **Bumpers**. Thank you very much. That is very helpful testimony. My guess would be that we will amend the bill along precisely those lines, or try to anyway, if we get to markup with it, which is a question, but I appreciate, Mr. Miller, your testimony and the time you took to prepare that testimony because it really is instructive.

[The prepared statement of Mr. Miller follows:]

STATEMENT OF JOHN R. SHEAFFER; H. CRANE MILLER; AND LEE ROZAKLIS; SHEAFFER & ROLAND, INC., BEFORE THE COMMITTEE ON ENERGY & NATURAL RESOURCES, CONCERNING S. 2686, A BILL TO PROTECT BARRIER ISLANDS AND FOR OTHER PURPOSES.

Mr. Chairman, Members of the Committee.

My name is Crane Miller. I am Vice President & General Counsel of Sheaffer & Roland, Inc., and appear here today on behalf of Dr. Sheaffer who had an unavoidable conflict and asked me to present our views on this important legislation. We appreciate this opportunity to testify on S. 2686, and are particularly pleased that you have introduced this legislation, Mr. Chairman.

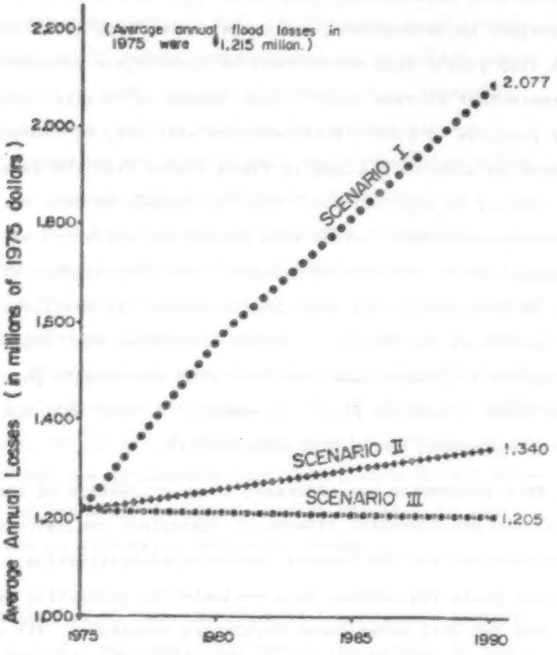
You have taken the initiative to protect priceless natural values on our barrier islands. In doing so you have also taken an important step toward reducing or prohibiting unwise federal expenditures and financial assistance for access to the islands, for construction of roads and other infrastructure which lead to development of the islands, and for structural measures to halt inevitable erosion and other natural processes. By removing such federal expenditures and financial assistance, S. 2686 is consistent with Congressional strategies to shift some of the risks of development in hazardous areas away from the Federal Government and to place them on those who create the risks by building and living in the hazardous areas.

As written, S. 2686 is consistent with an evolving strategy used by the Federal Government to deal with flood losses. At the beginning of this century, the Government's strategy was laissez faire -- property owners who built on the floodplains bore their own flood losses. A second strategy was marked by Congress's acceptance of national responsibility for structural flood control works, beginning with the Flood Control Act of 1936. Since 1936, the Federal Government has invested over $11 billion in structural flood control works to reduce riverine and coastal flooding. Despite that investment, average annual flood losses have continued to increase. The U.S. Water Resources Council currently estimates that average annual urban flood losses exceed $1.5 billion.

A third strategy is still evolving, and S. 2686 would be an important contribution to that strategy. It is marked by a shift away from sole reliance on structural flood control works to other, nonstructural management methods. It is marked also by the Congress's attempt to shift some of the costs and risks of flood losses to those who create the risks, the occupants of the flood plains. The National Flood Insurance Program is the principal legislative tool that the Congress has enacted for nonstructural floodplain management and for shifting the risk to flood plain occupants. The prohibitions of S. 2686 against federal expenditures and financial assistance that induce development on the undeveloped, unprotected barrier islands would be an important additional source of authority if enacted. It would also be a major addition to the Congress's strategy toward nonstructural management measures to reduce flood losses.

The tools of nonstructural floodplain management traditionally exercise police powers through local or state building codes, local building permits, zoning, and other noncompensatory authority of governments to regulate land uses. Those powers are limited by the "taking" provisions of the Fifth Amendment. By prohibiting Federal expenditures and financial assistance to certain activities on barrier islands, S. 2686 adds new dimension to Congress's management strategy, removing some of the financing that makes development on the islands financially attractive and economically justified.

Figure 1: Alternative Trends in Average Annual Flood Losses for U.S. Urban Floodplains[a]



[a] For existing and future structures within the currently delineated flood hazard area.

Source: Sheaffer & Roland, Inc., *Evaluation of the Economic, Social and Environmental Effects of Floodplain Regulations*, Department of Housing & Urban Development, Washington, D.C. (February 1979)

Despite the major contributions to flood loss reduction that S. 2686 will make through removal of some of the federal financial incentives to development, and despite the flood loss reduction that will result from enforcement of flood plain regulations, we estimate that average annual flood losses on barrier islands will continue to rise. Such measures will not, of themselves, produce an absolute decline in flood losses from the levels that the country is experiencing. This is largely because privately financed development raised to a prescribed elevation will still be permitter on the barrier islands. This development will inevitably be affected by the catastrophic storm. In addition, the urban infrastructure and shore protection associated with the development is subject to damages and loss both from the catastrophic storm and from lesser floods as well. In essence, S. 2686 will not prevent such development, but should forestall it.

This phenomenon was addressed in an evaluation of the economic, social and environmental effects of floodplain regulations that our firm conducted for the Federal Insurance Administration. Effects of flood plain regulations were evaluated by projecting development for 1980 and 1990 under three regulatory scenarios: (1) no regulations, allowing the free market to determine the 100-year floodplain use; (2) moderate regulations similar to the current flood insurance regulations; and (3) stringent regulations forbidding new development and substantial improvements to existing structures.

As shown in Figure 1, when no regulations were applied under Scenario I, average annual urban flood losses increase sharply from the $1.2 billion per year level in 1975 to $2.1 billion per year in 1990, an increase of 71 percent. Under the moderate regulations of Scenario II, the losses in Scenario I (no regulations) would decrease by 85% in 1990. Regulations that prevent development

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(Scenario III) further decrease losses, producing a small, but measurable decline in average annual flood losses (1% by 1990).

The most effective strategy that the Congress could invoke would be prohibition of federal expenditures and financial assistance currently in S. 2686, coupled with acquisition authority to permit the Secretary of the Interior to purchase barrier islands from landowners who wish to sell their properties voluntarily. For the reasons spelled out below, this additional authority in S. 2686 would be demonstrably cost effective.

To demonstrate the effectiveness of the strategy, some facts about the undeveloped, unprotected barrier islands, barrier spits, and bay barriers ("barrier islands") included in S. 2686 are in order. Those barrier islands total approximately 484,000 acres, 305,800 of which are wetlands, 160,000 of which are developable fast lands, and 18,300 of which are interior waters. Of the 160,000 acres that are developable fast lands, about 88,600 acres are found on 120 partially developed barrier islands, and about 71,300 acres are on 63 totally developed islands.

The distribution of these undeveloped, unprotected islands is shown in Table 1. Note that over 96% of the acreage is found from Virginia south along the Atlantic coast and along the Gulf Coast. Texas alone constitutes over 50% of the total undeveloped, unprotected acreage; Texas and Louisiana together comprise nearly two-thirds of the total acreage under consideration. To obtain a measure of the effectiveness of acquisition, we have compared the costs of current programs for federal expenditures and financial assistance on the undeveloped, unprotected barrier islands to the cost to acquire selectively 160,000 acres of undeveloped,

TABLE 1

DISTRIBUTION OF PARTIALLY DEVELOPED AND TOTALLY UNDEVELOPED BARRIER ISLANDS AMONG THE ATLANTIC AND GULF OF MEXICO COASTAL STATES

State	Partially Developed Fast (Acres)	Partially Developed Wet (Acres)	Totally Undeveloped Fast (Acres)	Totally Undeveloped Wet (Acres	State Total	No. BI Units Totally Undeveloped/Total No. Units
Maine	617	443	-0-	-0-	1,060	0/4
Massachusetts	3,930	2,009	1,520	1,088	8,547	6/40
Rhode Island	881	435	70	-0-	1,386	1/10
Connecticut	234	900	22	29	1,185	1/9
New York	1,093	313	-0-	-0-	1,406	0/14
New Jersey	1,466	2,024	-0-	-0-	3,490	0/5
Delaware	156	200	-0-	-0-	356	0/1
Virginia	2,905	1,705	1,786	6,018	12,414	3/4
North Carolina	5,807	6,611	2,631	15,078	30,127	8/16
South Carolina	1,825	6,667	10,126	23,127	41,745	14/20
Georgia	-0-	-0-	5,706	22,804	28,510	3/3
Florida	15,536	8,831	4,538	3,385	32,290	7/22
Alabama	794	2,318	33	178	3,323	1/3
Mississippi	-0-	-0-	1,970	1,325	3,295	3/3
Louisiana	3,036	21,593	16,185	18,371	59,185	11/16
Texas	50,362	131,760	26,701	28,592	237,415	5/13
Totals	88,642	185,809	71,288	119,995	465,734	63/183

Total Fast Lands & Wetlands	465,734 Acres
Wetlands	305,804
Total Fast Lands	159,930 - say 160,000 Acres
Totally Undeveloped	71,288 - say 71,300 Acres
Partially Developed Isl.	88,642 - say 88,600 Acres

Source: "Undeveloped and Unprotected Barrier Islands of the United States", U.S. Department of the Interior, National Park Service (April 1980) unprotected fast lands on those same barrier islands.

Estimated Costs to the Nation Under the Current Programs Approach

The estimated Federal costs associated with the development of the undeveloped, unprotected barrier islands are based on the following premises:

- there remain approximately 484,000 acres of undeveloped, unprotected barrier islands, about 324,000 acres of which are wetlands and interior waters, and 160,000 acres of which are fast lands;
- 80,000 acres of the fast lands will be developed (50 percent of the total fast lands) over the next 20 years (See Table 3);
- average density on the developed acres will be five dwelling units per acre;
- average occupancy will be 4.3 persons/dwelling unit;
- 80 gallons per capita per day water use;
- 80 gallons per capita per day sewage flow; and
- average distance to mainland of 1.5 miles per island for 50 separate island units that require bridges in order to be developed.

The costs presented arelimited to the major elements in the urban infrastructure, disaster relief, flood insurance subsidies, and shoreline structural activities. For urban infrastructure, the costs are presented at today's values. With respect to the other items, an average annual value was computed and the present worth over 20 years was computed. Urban services were limited to the 50 percent of the islands that would be urbanized under our premises.

Many costs were not incorporated into the analysis because they are generally state and local costs. This evaluation is limited to those items most likely to involve Federal funds.

TABLE 2

INVENTORY OF BARRIER ISLANDS

Category	Acreage
Developed Area	280,000
Undeveloped and Unprotected but Potentially Developable	480,000
Public Domain and Not Developable	840,000
Total	1,600,000

Source: National Park Service data (1980).

TABLE 3

PROJECTED DEVELOPMENT OF UNDEVELOPED, UNPROTECTED BARRIER ISLANDS

Category	Acreage	Percent
Residential Development	80,000	17
Public Streets/Utilities	48,000	10
Open Space/Public Uses	32,000	6
Wetlands & Interior Waters	320,000	67
Total	480,000	100

TABLE 4

PROGRAM COST SHARING USED IN THE ANALYSIS

PROGRAM	PERCENT FEDERAL SHARE	AGENCIES
Sewers	75	FHA, EPA, EDA, HUD
Wastewater Treatment	75	FHA, EPA, EDA, HUD
Water Supply	50	FHA, HUD, EDA
Roads, Causeways and Bridges	70	FHWA
Disaster Relief	100	SBA, FEMA (DR&R)
Flood Insurance	80	FEMA (FIA)
Shoreline Stabilization	70	COE

Sewers/Wastewater Treatment

The surficial geology of the barrier islands generally precludes the use of individual septic systems for wastewater treatment. Consequently, a centralized wastewater collection and treatment system will be required on each island. The costs for local and collector sewers as well as wastewater treatment plant capacity were considered in this analysis. A figure of 800 linear feet of sewers per developed acre of land was used, reflecting average sewer layouts for a typical linear five-dwelling unit per acre density. The average costs of such sewers, including materials, installation and associated pumping facilities, was estimated at $15 per linear foot, based upon a survey of typical costs for level, sandy soil communities. Treatment plant capital costs of $4.67 per installed gallon per day capacity reflect the current costs for small-capacity (0.1 to 0.5 MGD) plants for BOD removal without nitrification.(1) The wastewater flow from an acre of residential developed land at a 5 d.u./acre density was assumed to be 1,720 gallons per acre per day. The Federal funding share for wastewater treatment facilities and sanitary sewers is estimated to average 75 percent of costs from EPA, EDA, HUD, and FHA sources.

Sewers: 160,000 acres x 50 percent urbanized
x 800 l.f./acre x $15/l.f. = $0.96 billion

Wastewater Treatment: 160,000 acres

x 50 percent urbanized
x 1,720 gpapd x $4.67 = $0.64 billion

$1.60 billion

at 75 percent Federal funding (EPA, EDA, HUD, FHA) = $1.20 billion

Water Supply

The vast majority of barrier islands are underlain by very limited fresh groundwater lenses which are inadequate for support of any appreciable development.(2) A fresh water supply source from the coastal mainland is therefore an additional requisite for development. The water supply costs considered in this analysis include the costs for water well and treatment plant capacity, transmission mains from the mainland to the islands, and local water supply lines. A water supply flow of 80 gallons per capita per day, equivalent to 1,720 gallons/acre/day was used at a water well/reservoir and treatment cost of $4.00 per gpd capacity, based upon typical coastal consumption rates and costs. The cost of transmission mains of $50 per linear foot is based upon current average costs for installation of such facilities across a marine and coastal setting. The costs for local water lines of $12 per linear foot reflects typical current residential development costs in sandy soils. Typical Federal funding shares of 50 percent can be expected from agencies including HUD, EDA, and FHA.

Water Supply/Treatment: 160,000 acres x
50 percent urbanized x 1,720 gpapd
x $4.00/gpd = $0.55 billion

Transmission Mains: 92 islands x 1.5 miles
x 5,280 feet/mile x $50/l.f. = $0.04 billion

Local Supply Lines: 160,000 acres x
50 percent urbanized
x 800 l.f./acre x $12/l.f = $0.77 billion

$1.36 billion

at 50 percent Federal funding (FHA,
EDA, HUD) = $0.68 billion

Bridges, Causeways, and Roads

The 160,000 acres of potentially developable land lies within 183 different barrier island units. Road access to these areas is a requirement for development. Recent costs for bridge and causeway construction have averaged $10 million per mile, reflecting the relative difficulty of structurally and environmentally sound construction over coastal waters, wetlands, and unstable soils. (3,4) Review of the National Park Service's barrier island inventory indicates a need for 50+ bridges if the islands were to be developed. (7) Island roads through developed areas average $26 per linear foot with approximately 400 linear feet of public roadway required per acre developed. (3) The federal share of these costs, based upon the current FHWA cost sharing formula is approximately 70 percent.

Causeways/Bridges: 50 island units
x 1.5 miles x $10 million/mile = $0.75 billion

Island Roads: 160,000 acres x 50 percent
urbanized x 400 l.f./acre
x $26/l.f. = $0.83 billion

$1.58 billion
at 70 percent Federal funding (FHWA) = $1.11 billion

Disaster Relief

Between 1972 and 1979, the Small Business Administration (SBA) and the Federal Disaster Assistance Administration (FDAA) (now known as Disaster Response and Recovery (DR&R) of the Federal Emergency Management Agency), spent an average of $1.14 billion annually on disaster relief. (5) Approximately 80 percent of this figure was for flood-related damages. Ten percent of flooding damages reported were coastal flood-related with 90 percent of coastal flood damages resulting from barrier islands. This is equivalent to $82 million/year in expenditures for damages to barrier islands over the last eight years, during which time development of barrier islands totaled 225,000 acres, or 14 percent of their total land area.(2) With an additional 80,000 acres, or 5 percent developable, this expenditure can be expected to rise to $110 million, representing an annual increase of $78 million. The present worth cost of this additional expenditure over a 20-year period, using the current Water Resources Council discount rate of 7-1/8 percent, is $0.29 billion. However, this figure ignores the current inflation rate of 18 percent and the expected durability of the annual rise in housing costs (12 to 15 percent) over the next 20 years. If these factors are accounted for, a discounting rate of 3 to 4 percent is more representative. This would result in a present worth cost of $0.42 billion for disaster relief.

Federally-Subsidized Flood Insurance

At the current participation rate, the Federal Insurance Administration experienced a net annual deficit of $278 per policy for barrier island policies over the period 1972 to 1978.(6) There are currently 180,000 policies held on existing barrier island development (225,000 acres developed). (8) This amounts to an annual FIA expenditure of $50 million. If 80,000 additional acres are developed, this annual expenditure can be expected to rise to $67 million, an increase of $17 million per year. At the current WRC discount rate, this increase has a present worth value of $0.18 billion. If current inflation and housing cost trends are accounted for, as described in the previous section, the present worth of this increased expenditure is $0.75 billion. This expenditure may be reduced as more policies are put on actuarial rates and there is more participation in the flood insurance program. However, due to the very high actuarial costs of insurance on barrier islands, there will be considerable political resistance to such rate increases.

Shoreline Stabilization/Flood Control/Harbor Maintenance

The U.S. Army Corps of Engineers spent $11 million annually for beach enrichment alone on barrier islands over the last three years.(2) It is estimated that another $22 million per year was spent by the Corps on associated structural flood control, shoreline stabilization measures, and harbor and waterway dredging.(2) If 80,000 additional acres are developed, this current annual $33 million expenditure is expected to rise to $45 million, at a present worth value of $0.47 billion over the next 20 years (using the Water Resources Council discount factor).

Summation

Table 5 summarizes these Federal costs. Not included in these costs are Federal expenditures for Army mobilization for evacuation and clean-up efforts, incremental Federal costs for management of infrastructure funding programs and disaster relief agencies, and costs to U.S. fisheries due to degradation of critical feeding, spawning, and shellfish areas resulting from increased barrier island development.

TABLE 5

COST SUMMARY

Programs	Federal Costs[a]	Percent
Sewers and Wastewater Treatment	$1.20 billion	29
Water Supply	$0.68 billion	16
Roads/Access	$1.11 billion	27
Disaster Relief	$0.42 billion	10
Flood Insurance	$0.25 billion	6
Shoreline and Harbor Maintenance/Flood Control	$0.47 billion	11
Totals	$4.13 billion	100

[a] For a 20-year period.

Estimated Costs to the Nation Under the Public Purchase Approach

We estimate that the federal costs to purchase in fee simple the remaining 160,000 acres of undeveloped, unprotected fast lands on the barrier islands have a present worth of $5,000 per acre. This is equivalent to $800,000,000 to purchase all of the fast lands, both on partially developed and totally undeveloped islands.

The value of $5,000 per acre was derived from review of the records of the National Park Service for the purchase, taking, and condemnation of 6,438 acres of land for the Cape Lookout National Seashore (N.S.), Cumberland Island N.S., Canaveral N.S., and Gulf Shores N.S. during the period 1974 - 1979. The total acquisition costs for these lands was $31,482,886, or an average of $4,890 per acre. For estimation purposes, we have increased the cost per acre slightly to $5,000, to produce a conservative result. Note that this cost per acre is $800 per acre higher than the cost we previously projected in testimony before the House of Representatives on H.R. 5981. This information on which we have based the $5,000 per acre estimate was not available to us when we prepared testimony on H.R. 5981. Note also that the average figures encompass both the land acquisition costs for totally undeveloped lands and lands on partially developed barrier islands, and are considered conservative.

Conclusions (Current Federal Programs vs. Public Acquisition)

Public purchase of undeveloped, unprotected barrier island fast land areas is the most cost effective approach to manage these unique and fragile ecosystems. Fee simple purchase would reduce federal budgetary requirements when compared with a current programs approach, that is, when compared to the status quo. A 20-year current programs approach will require a present value expenditure of $4.13 billion. On an acreage basis, this amounts to $25,812 per acre for the 160,000 undeveloped, unprotected acres of fast lands. When compared with the estimated purchase price of $5,000 per acre, the cost to the Federal Government, if development takes place, is 5.2 times greater than the cost of purchasing all of the fast land acres (160,000 acres x $5,000/acre = $0.8 billion).

Role of the National Flood Insurance Program

Mr. Chairman, Section 3(b)(3) of S. 2686 seeks to prohibit flood insurance policies for structures built on undeveloped, unprotected barrier islands after May 8, 1980. Notwithstanding that as written Section 3(b)(3) does not accomplish what it appears to set out to do, we recommend deletion of that subsection.

The National Flood Insurance Program has borne the brunt of much criticism for its role and perceived role in the development of barrier islands. To an extent the criticism is warranted; to a greater extent the criticism should be leveled at other federal programs.

Our analysis above of the current programs approach to development of the barrier islands shows that federal subsidies of flood insurance amount to 6% of the total, while federal subsidies for bridges, roads, water supply, and wastewater treatment, and shoreline protection comprise 83% of the total. By comparison to the impact that roads, bridges, and other infrastructure have on barrier island development, federal flood insurance subsidies have relatively minimal impact and should decrease as more actuarial rates are applied in communities in the full flood insurance program.

But the most important reason for deleting Section 3(b)(3) is that the National Flood Insurance Program currently provides the only effective minimum management standards to reduce coastal flood losses nationwide. If the availability of flood insurance and its minimum floodplain management requirements are removed, communities would revert to inappropriate building practices in their coastal flood hazard areas, under heavy development pressure.

Moreover, the National Flood Insurance Program currently provides the authority for acquiring properties where landowners wish to sell their flood damaged properties voluntarily -- under the "constructive total loss" interpretations of standard flood insurance policies, and under §1362 of the National Flood Insurance Act. I understand that one of the first uses of the acquisition authority of §1362 will be on a barrier beach in Scituate, Massachusetts, where houses were devastated by the February 1978 storm.

The National Flood Insurance Program is the Congress's principal tool for nonstructural floodplain management to reduce both riverine and coastal flood losses. Despite the Program's shortcomings, it is much too early to write it off as a failure on the barrier islands, or to attribute to it development that was encouraged or induced by bridge and road access and other infrastructure supporting development.

Summary of Recommendations

- We recommend enactment of the provisions of S.2686 that would prohibit federal expenditures and financial assistance for infrastructure, facilities for access to the barrier islands, and structures for shoreline stabilization on the undeveloped, unprotected barrier islands.
- We recommend deletion of Section 3(b)(3) from the bill.
- We recommend addition of acquisition authority similar to that provided in H.R. 5981, to permit selective acquisition of barrier islands as a cost effective management measure.

Once again, Mr. Chairman, we commend your initiative in introducing S.2686 and in holding these hearings. Thank you for the opportunity to appear before you today.

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REFERENCES

(1) Benjes, Jr., H.H., Small Community Wastewater Treatment Facilities - Biological Treatment Systems, (prepared for the U.S. EPA Technology Transfer National Seminar on Small Wastewater Treatment Systems).

(2) Department of the Interior, Alternative Policies for Protecting Barrier Islands Along the Atlantic and Gulf Coasts of the United States and Draft Environmental Statement, December 1979.

(3) Davenport, Sally S., "Development on Texas Barrier Islands . . . Does It Cost the Taxpayer More?" (Testimony before the House of Representatives, Committee on Interior & Insular Affairs, Subcommittee on National Parks & Insular Affairs, March 27, 1980).

(4) "Concrete Bridge Bid Over Estimate", Engineering News Record, February 21, 1980, p. 13.

(5) Platt, Rutherford H., "Federal Disaster Assistance: SBA, FDAA(DR&R), and FIA, 1972 - 1979."

(6) Jimenez, Gloria M., Testimony before the House of Representatives, Committee on Interior and Insular Affairs, Subcommittee on National Parks & Insular Affairs, March 24, 1980.

(7) National Park Service, Department of the Interior, Undeveloped and Unprotected Barrier Islands of the United States, Washington, D.C., April 1980.

(8) Federal Insurance Administration, Federal Emergency Management Agency, "V-Zone Risks - Building Coverage as of February 14, 1980" (Computer Printout, 1980).

Senator **Bumpers**. We have two final witnesses. I am going to have to go vote. I don't know whether I am going to get trapped over there or not. I am going to try to get back and conclude the hearings.

We have William Painter, the Coast Alliance, and Brock Evans with the Sierra Club to testify. I can't promise that I am going to get back, but I am going to do my very best.

If I don't, we will continue the hearing just to hear these two witnesses at some point, but I want to conclude these hearings this morning. I will try to be back in just a few moments, but we will stand in recess until we find out.

[A brief recess was taken.]

Senator **Bumpers**. Mr. Painter, why don't you lead off for us, please?

STATEMENT OF WILLIAM PAINTER, EXECUTIVE DIRECTOR, COAST ALLIANCE

Mr. **Painter**. Thank you, Mr. Chairman, I will try to be very brief and skim through some of the highlights of my written testimony.

I would like to point out that in my testimony I have written a few paragraphs about the natural values. We have attended these hearings to focus on the issues of Federal subsidies which certainly are important, but I would just like to note that I have put that in the record to remind us that these are areas with significant ecological, scientific, and recreational value to our Nation.

I would like to make three or four overall points. One is that we have heard earlier from an administration witness a long list of programs that are supposed to have taken care of a good bit of the problem that this legislation is trying to address, and he was followed shortly by Dr. Frank who proceeded to list a number of examples of places where in fact this kind of protection that we were told we had didn't seem to be working.

We heard about houses being built on a sand bar that was created by a metty in Brigantine, N.J., and we heard about a condominium being built either in front of or outside of the protection of the Galveston seawall.

Somewhere, somehow the coastal zone management programs and the 404 permits and the other things that he told us were supposed to be preventing this kind of situation did not work there, and we would submit that if one went up and down the coast and looked, you would find other examples similar to that.

With regard to the acquisition question, we would like to suggest that some limited acquisition would be a desirable addition to the bill.

We would not think that we need to be thinking about say $800 million in the next few years to go buy all of these lands. Rather we think that having some limited amounts of funds and perhaps exercising those funds, the exercise of those funds under some kind of limited authority say something that said a willing seller basis only except in the case where someone was about to develop an area in an unwise manner that would destroy ecological values or create new hazards to human life and property, that having some knowledge available to do that in some of the instances where the other restrictions in the bill might not completely discourage development would be desirable, but we do not think we need to be thinking about huge amounts of money and going out and buying every last one of these islands over the new few years.

Regarding flood insurance programs, one of the problems that wasn't quite clarified here is that there are really two different flood insurance programs that are all a part of the same effort, but we have a number of communities that are in what is called the emergency phase of the program, and then we have other communities that are in the regular phase.

The main difference between these two is that those in the emergency phase have been given rather general maps that basically draw shade in an area of their community and it says this is a flood hazard area and you should be careful here and they are asked to carry out the minimal regulations in order to be eligible for the subsidized insurance that the program provides.

Later after the funds and time have been available to do a much more detailed map, that allows one to look at different locations and elevations and do quite accurate estimates of the degree of risk, then it is possible to write insurance at true actuarial rates. You simply cannot do that without those maps and those maps do take quite a bit of money to prepare, and so what we have is still quite a few communities in this country, and I think there are a number of them on barrier islands, that are still in the so-called emergency phase.

The problem there is that people can build new structures and receive subsidized insurance for those structures now and on into the future, indefinitely into the future.

One thing we would urge consideration if you wanted to stop short of just eliminating the flood insurance program in general from these areas, was suggested by a previous witness, is to look at things such as allowing the subsidized insurance for any structures that might happen to already be located in these areas to continue, but not to allow any insurance for new construction, or else if you did allow insurance for new construction, that the level of subsidies for that construction be much lower than it is for previously existing development because after all, the people that are building out there now do have the benefit of these initial maps that do mark the areas that are hazardous and I don't think that society needs to be quite as concerned about their fate as people who located there, as in the case of Senator Schwartz, years and years ago before they knew how, we as a society knew how dangerous these areas were.

Another option, one that could be combined with the second one, is to tell people fine, we will give you subsidized insurance. At this point we don't have the maps available with which to determine actuarial rates, but when we get those, you will be charged actuarial rates, no matter how high they may be.

I think that will discourage quite a few people from moving in and developing these areas.

I would just close by saying that we do have concerns with the broadness of the exemptions with regard to the energy facilities, recreational facilities, and protection of the natural egosystems and would urge that those be looked at, and if possible, heightened in some way to make sure that we don't have broader, the kind of things that we really I am sure were not intending being developed by use of that language in the exemption.

Thank you for the opportunity to present this testimony.

Senator BUMPERS. Thank you.

[The prepared statement of Mr. Painter follows:]

coast alliance
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STATEMENT OF WILLIAM PAINTER, EXECUTIVE DIRECTOR, COAST ALLIANCE BEFORE PARKS SUBCOMMITTEE OF THE SENATE ENERGY AND NATURAL RESOURCES COMMITTEE UNITED STATES SENATE, WASHINGTON, D.C. JUNE 12, 1980

Mr. Chairman and Members of the Committee, I am Bill Painter, Executive Director of the Coast Alliance, which represents a broad and virtually comprehensive spectrum of environmental organizations plus others concerned about our nation's coastal resources. In addition to the National Wildlive Federation, National Audubon Society, Izaak Walton League, Sierra Club, and Natural Resources Defense Council, our 33-member Board of Directors includes representatives of labor, sports and commercial fishermen, and civic groups such as the League of Women Voters. I appreciate this opportunity to present tesimony.

One of the Coast Alliance's primary functions is the promotion and coordination of 1980 as the Year of the Coast, a nationwide effort to educate the public about the value of our coasts and the need to protect them. In our role as coordinators of this campaign, we receive press clippings on coastal matters from all over the country. The amount of coverage has been large, and reflects deep concern about the future of these vital resources. Heading the list of topics covered is the problem of federal subsidies to private development in coastal high hazard areas,particularly barrier islands. The fact that much of this coverage came from interior states such as South Dakota and Arkansas demonstrates that this is an issue of concern to people throughout our nation.

The citizens of the United States are coming to the realization that despite the warning from Jesus in his Sermon on the Mount that only a fool builds on sand, each year thousands of homes and other structures are being built on the shifting sands of the 295 barrier islands that run along our Atlantic and Gulf coasts. They are asking why people would invest in construction on such dangerous places, and are learning that their own tax dollars are being used to make living there financially feasible for the relatively few who choose to do so.

A vast array of federal loans and grants--for bridges and highways, water supply and sewage treatment, erosion control, mortgage insurance,and subsidized flood insurange--induce development which will be damaged or destroyed in the first big storm, and then--more often than not--rebuilt in exactly the same location with the help of federal disaster relief grants and low-interest loans. This pattern is repeated again and again. One study has concluded that since 1972 more than 1900 communities, many on barrier islands, have been declared official national disaster areas at least two times, and received the usual array of taxpayer assistance. We Americans are a compassionate people, but there is only so much sympathy that can be extended to someone who places their life and property in such a danger-filled location. To date, however, our government policies still say: Come build by the sea and ignore the risk--we'll arrange for your fellow taxpayers to bail you out each time.

What are the real costs of this policy? A recent Department of Interior study found that the federal government has spend 500 million dollars in the last three fiscal years alone in ways that encourage the development of barrier islands. We believe this figure understimates the total costs, as it does not include large federal expenditures for payouts on subsidised flood insurance policies or subsidized loans and grants for disaster relief. Furthermore, several of the involved agencies were unable or unwilling to provide information on how much they spent on such programs.

The cost of coastal storms which accelerate erosion and batter the shore, plus effects of the gradual process of migration of these islands, mounts annually with increasing shoreline urbanization. (Barrier islands are urbanizing at twice the rate of land nationwide.) Winter storms account for a substantial share of this harm, with an average of 40 "northeasters" striking the coast each year. These include the great Ash Wednesday storm of 1963 with its waves 30 feet high and the February 1977 storm that inflicted $500 million in damage.

With increasing property vulnerable to storm damage, the cost of each hurricane or other storm increases. In 1979, Hurricane Frederick cost $2.3 billion and Hurricane David $390 million. Development on Dauphin Island, Alabama, was destroyed by 140 m.p.h. winds and waves 22 feet above normal sea level, despite the fact that many of the structures were elevated several feet above ground level, as specified by the National Flood Insurance Program.

In other testimony presented here, we will hear of one study which concludes that if current trents for barrier island development continue over the next 20 years, over $11 billion in taxpayer dollars will be spend in subsidizing development in these spits of shifting sands.

The loss of human life resulting from the development of these hazardous islands should not be forgotten. Six thousand people died when a hurricane hit Galveston, Texas--located on a barrier island--in 1900. Storms hitting Florida, Long Island, and other coastal sites have also killed large numbers. Experts are fearful of huge losses of life, perhaps in the tens of thousands, when the next major hurricane hits a heavily urbanized barrier island.

These facts alone provide ample reason for leaving undeveloped barrier islands in their current state. However, one should not overlook the extraordinary park and recreation, fish and wildlife, and scientific values provided by such places.

These islands provide habitat for a wide array of fish and wildlife, including some species which are endangered or threatened. Resident mammals include river otters, several species of deer, and the famous wild ponies. The loggerhead turtle lays its eggs on the beaches of some of the islands. Alligaters and other reptiles haunt the marshes and swamps of various of the islands. Larger species of bird include the bald eagle, whooping crane, and brown pelican. Numerous types of smaller wading birds can be found on the sand flats and mud flats to the back of the islands. Large numbers of ducks and geese stop along the barrier island chain during the spring and fall migrations. Many kinds of shellfish are found in the waters and wetlands surrounding the islands.

Because of their beauty and the bounty of plant and animal life they harbor, barrier islands offer outstanding recreational opportunities. People travel from all other the country to swim in the surf, lie in the sun, fish off the beaches, gather shellfish, observe birds and other wildlife, camp, hunt, and hike.

The National Parks Service reports that the barrier islands that they manage as parks receive very high levels of visitorship, totalling tens of millions annually.

Here we have a situation in which sound economic policy and sound ecological policy merge. Actually this is the case much more often than many would realize or acknowledge, but the convergence of these two concerns could not be more obvious than it is in the matter of barrier island development.

On behalf of all those associated with the Coast Alliance, I would like to express my deep appreciation for the leadership that the Chairman of this subcommittee, as well as the other co-sponsors of S. 2686, for the leadership role they are playing on this critical issue. We believe that passage of this legislation would represent a major step toward the establishment of a rational policy toward barrier islands. Elimination of federal supports for development of the heretfore undeveloped lands would greatly reduce the pressures for unwise development which would cause substantial ecological damage and place hundreds of millions of dollars worth of property and tens of thousands of human lives in great jeopardy over the next several years.

We would like to encourage consideration of the inclusion of some authority for acquisition of land. We believe that some developers will have sufficiety capital to proceed with construction of homes without federal financial assistance. If they are lucky, and they sell most of their units before the area is hit by a major storm, hundreds of individuals and families would be left "holding the bag". When the inevitable storm did occur, it is unlikely that legislation requiring denial of federal disaster relief would be enforced. Having some funds available for acquisition of land in situations such as this could prevent considerable loss of life and taxpayer expenditures in the long run.

Acquisition programs could be tailored to provide for transfer of acquired lands to appropriate units of state and local government. A program based largely on purchase from willing sellers might also be desirable, with condemnation applied only in the event of substantial changes in use of the affected lands that would damage the environment, increase risk to live, or create actual or potential new liabilities for the federal government.

We believe that the establishment of a Barrier Island Council designed to present recommendations for broad federal policy on an ongoing basis, and to review and comment on proposed actions of federal agencies affecting these islands is a good one. Such a Council could help identify the immediate and long-range costs of proposed actions to the taxpayers and other interests, as well as the savings offered by proposals employing the spirit of S. 2686.

We are quite concerned with the broadness of the exemptions provided in Section 3(b)(4). Although we agree that some flexibility should be applied with regard to certain energy-related facilities such as oil and gas pipelines, we strongly urge that such projects be allowed only if there is no prudent and feasible alternative that does not involve barrier islands. We believe that public recreation needs to be very carefully defined, as this could range from trails and primitive campsites to multi-million dollar amusement parks. Although we would not quarrel with measures to protect barrier island ecosystems, we would be concerned with how this phrase might be interpreted.

With these reservations, we urge prompt action on this legislation. We submit that this program not be applied on a piece-meal basis. Federal subsidies should be eliminated for all undeveloped islands and portions of islands. Further waste of taxpayers' dollars in support of unwise development should be halted across the board, not just here and there, depending upon the political climate. If local governments and private development interests feel that they would benefit greatly from development currently undeveloped barrier island lands should be required to assume the full costs, "front end" and "back end", associated with the benefits they seek, regardless of who they are or where they are located.

This concludes my formal statement. Again, I would like to thank you for the opportunity to present this tesitmony. I would be happy to respond to any questions you might have.

Senator **Bumpers**. Mr. Evans.

STATEMENT OF BROCK EVANS, ASSOCIATE EXECUTIVE DIRECTOR, THE SIERRA CLUB

Mr. **Evans**. Thank you, Mr. Chairman. I appreciate your taking the time and trouble to come back to hear us, and I can summarize also.

The threat of unwise development on barrier islands is something that Sierra Club considers of highest importance.

I was disappointed to sit in the room and hear the administration witness earlier say that we should have more delay because everything seems to be OK, existing programs are working.

We think we are here, Mr. Chairman, in large part because past programs don't seem to be working very well. The Coastal Zone Management Act is an act we have supported, but it doesn't go far enough. It is voluntary, as you know, as to State participation. It has a basically weak standard.

The administration itself ironically has even supported severe budget cuts, and a phaseout. I don't know if that was mentioned or not. It relies too much on the State who just can't do the whole job.

Bill mentioned what is happening in some State programs, the Brigantine example being one example, but we think the Federal Government must get its own house in order, and that is why we are here today, too, and this bill would at least do it in large part.

We were also disappointed to hear the administration witnesses say they wanted more delay. They have already taken 3 years to study this, and we don't feel we can afford to wait much longer. We feel that tragedy of the kind Mr. Frank so eloquently demonstrated is certainly going to come again rather soon. We think it is by definition a prudent person who wouldn't want to locate on the barrier islands unless there were large resources available to support the activity and rebuilt of activity after disaster strikes.

That is clearly the heart of the problem, and that is clearly what the legislation is addressing here. Not only does the subsidy represent an increasingly large drain on an already overly depleted budget, the Federal budget, but it encourages degradation of one of the most valuable coastal resources.

In my statement the next couple of pages document some of the ways in which Federal programs subsidize this which we have heard, so I will skip over to page 4.

The aftermath of Hurricane Frederick left a grim reminder to all of us of the cost of development of high hazard areas along the coast. As we know, the cost of this storm was about $2 billion in destruction, but despite the recent reminder, this recent reminder of the dangers of locating in a high-hazard area along the coast, rebuilding is now going on in some of the same areas just destroyed, and as we know, the Department of Transportation at present is granting $32 million in nonmatching grant to the Alabama Highway Department to construct a bridge to Dauphin Island. The end result will be redevelopment of most, if not all of the areas destroyed by Hurricane Frederick last year.

This amounts to a subsidy of over $20,000 per resident for the bridge alone, but that is only the tip of the iceberg. We haven't yet been able to get figures for other Federal subsidies.

Senator **Bumpers**. That was $20,000 for each resident on Dauphin Island?

Mr. **Evans**. That's right. There are about 1,600 residents, and the cost of the bridge is $32 million. I just divided that to come up with that figure.

Senator **Bumpers**. Is that to replace the bridge or build a new one?

Mr. **Evans**. That is to replace the bridge, and we feel other forms of transportation are more appropriate in view of the fact that this island is in the path of a hurricane storm track. We feel another service would be more modest in cost, and you can rebuild if you want to rebuild, but we only point this out to point out the nature of the subsidies in terms of a specific example at a specific place.

Our information is that the Federal share of funding for sewers and waste water treatment and roads and bridges and all the other kinds of subsidies for barrier islands ranges from 50 to 100 percent. That is the Federal share. The cost of these facilities and services on barrier islands is two or three times more on a per unit basis than the same facilities and services on the mainland, so as we see it, the price tag to develop and keep people living in coastal hazardous areas such as barrier islands is enormous, that the actual costs to the Federal Government are not readily available is in itself an indication of how little concern there has been in the past for responsible spending of our tax dollars.

We thank you very much, therefore, for introducing this legislation and holding the hearings. We think the overall concept of the bill is good, and it is an issue which has to be addressed and acted on we hope in this Congress.

S. 2686 strikes at the very heart of the problem, and although it doesn't address all the issues concerning the barrier islands, we think it is a very substantial beginning.

The Federal subsidy question has to be resolved we think if we are going to in any way protect this resource. I have to say here that some of us have a little trouble with statements to the effect we are taking away the economic value of the property if we are no longer subsidizing further development there.

The bill only says that you can build there if you want to, but we aren't going to spend tax dollars to subsidize it anymore. In view of the evidence of the destruction and the fact that these areas are in a storm track, that doesn't seem to us to be unfair. We do understand the problem, but I think there is another equity situation here, too.

It might be the way out of this might be to do something about the acquisition section. I know it is not in the bill and we know the reasons for it. We don't see acquisition naturally denoting a Federal takeover, nor does it necessarily have to include large Federal expenditures all at once.

It does, however, add a dimension to the bill which we see as giving the legislation much more flexibility. It will also give the landowner a few more options in how he or she decides to handle their property. The direct Federal acquisition isn't the only avenue. We could talk about easements, tax incentives, and a host of other options.

We would encourage the coordinated efforts for acquisition and safeguarding the resource through a combination of Federal, State, and local government as well as private organizations as was stated in section 1 of the bill.

A couple more quick comments on the legislation as I wind up here—the establishment of a Barrier Island Council in our opinion is not set up right now to act in an effective manner in the legislation. There are no funds to support adequate staff which will be needed to do an effective job, and, in addition, we would like its function to be more clarified so that it will not become an exemption vehicle rather than a conservation advisory forum for protection of this resource.

We would suggest the council before advising on any exemptions for Federal subsidy cutoffs must have documented costs to the taxpayers of this exemption as well as the environmental damage to the ecosystem.

Finally, we have some major reservations with the broadness of the exemptions as written in section 3. Bill Painter mentioned that, too. We think the intent of this section is well taken, and we support the intent.

However, many of the problems associated with the development of barrier islands exist because of the lack of restrictions on such areas as public recreation or protection of the barrier island ecosystem. We think these words need more clarification, these phrases.

We support public recreation on the islands, but not to the extent that it would jeopardize the ecosystem. In the case of the phrase "protection of the barrier island ecosystem," it seems obvious to us that this provision written in its present form could allow the Army Corps of Engineers' activities, subsidized by the taxpayer, to go on as they already have without any constructive language or reform.

We think phrases relating to energy development and navigational development likewise should have some clarifying language as we tighten up the bill hopefully in markup.

There is little doubt that some will make the argument that a more moderate approach should be taken by exempting some of the islands while protecting others.

We submit to you that if the cutoff for Federal subsidies does not remain largely in tact, that the true intent of the bill which is to cut unnecessary spending and protect these valuable resources, will be lost.

Many of the areas can't be developed in any event due to size and lack of height above sea level, and therefore they are already protected. It is those islands that are most readily available for development that S. 2686 must deal with to avoid precisely the kind of human tragedy that Dr. Frank so eloquently spoke of.

To advocate exemption for those islands we feel would be an attempt to undermine the proposed cutoff of Federal subsidies which is necessary for the ultimate success of addressing of this important issue.

With that I will just close, Mr. Chairman, and thank you again for coming back and giving us your time.

[The prepared statement of Mr. Evans follows:]

TESTIMONY OF BROCK EVANS
ASSOCIATE EXECUTIVE DIRECTOR, SIERRA CLUB
BEFORE THE
SUBCOMMITTEE ON PARKS, RECREATION AND RENEWABLE RESOURCES
REGARDING
S. 2686
JUNE 12, 1980

Mr. Chairman and Members of the Committee, we appreciate the opportunity to testify on what the Sierra Club considers of highest importance--the threat of unwise development on barrier islands. The Sierra Club is a member-funded, national environmental organization of 184,000. Our involvement with barrier island issues goes back to early 1960 with Assateague Island.

The Heritage Conservation and Recreation Service "Report of the Barrier Island Work Group" defines barrier islands as: "elongated narrow landforms consisting of unconsolidated sand. They are characterized by dynamic beach systems consisting of offshore bars, crashing surf, and a sand beach, dune ridges just behind the beach, interior lowlands, and bay-side wetlands." The report goes on to state: "They are locationally unstable because the erosion by waves and currents often affects a lengthwise migration along the coast, and also because the rising sea level contributes to a movement land-ward, following the receding shoreline. They are structurally unstable because unconsolidated sands are in constant flux, being ceaselessly eroded and deposited by winds, waves, and currents. Beaches expand in the summer and contract in the winter."

It would seem just by definition that a prudent person would not locate on a barrier island-- unless there were unlimited resources available to support this activity and rebuild after disaster strikes. The federal government and the taxpayer are in the business of supplying the resources needed to encourage and maintain development of these islands and of course rebuild if some natural disaster occurs. Not only does this subsidy represent an increasingly large strain on an already overly-depleted federal budget, but it also encourages the depredation of one of our most valuable coastal resources.

Clearly, the problem is that the coastal areas have become a significant attraction to man over the last twenty years. The population in the coastal counties in 1970 was 19,797,000; the rate of population increase between 1960 and 1970 was more than double the national rate, and the population density per square mile was more than four times the national average. The population of coastal counties was found to be 84% urban as compared to the national population which is 74% urban.

The roughly 300 units total about 1.6 million acres. Of these, approximately 621,000 acres are managed by Federal, State or local government agencies and 986,000 are under private ownership. Over 243,000 acres are considered to be developed while 625,000 are protected from future development.

In terms of land use or land cover, the greatest amount of area (about one-half) is wetland; nearly equal amounts are urbanized or barren (slightly less than 229,000 acres each). However, the data show that between 1950 and 1973-'74, slightly more than 137,000 acres were added to the urbanized column, while nearly that many were removed from the wetland column.

The actual cost to the taxpayer in terms of subsidies paid for barrier island development are unknown. In a letter to Congressman Norman Y. Mineta concerning the report, "How Federal Agencies Assure that Disaster Loan Recipients Maintain Mandatory Flood Insurance", the Controller, General Elmer B. Staats, states the following:

> [Federal Mortgage Housing Association] has adequate procedures to protect the Government's interest and assure borrower maintenance of required flood insurance. On the other hand, SBA (Small Business Administration), hampered by what it says are serious understaffing problems, essentially relies on the borrower to renew the insurance after the first year. The agency does not follow up to assure that the borrower has renewed the insurance and, unlike FmHA, it does not have contingency procedures which allow it to pay the renewal premium when the borrower does not.
>
> In addition, neither of these agencies nor the agency primarily responsible for coordinating disaster assistance and administering the national flood insurance program-- FEMA, the Federal Emergency Management Agency-- had adequate information on:
>
> -- how many communities nationwide had suffered repeat flooding;
>
> -- how many loans requiring mandatory flood insurance had been made in flood hazard areas; or
>
> -- how many borrowers required to buy flood insurance had failed to renew or had their insurance cancelled before final repayment of their loans.
>
> Consequently, we could not determine the extent of actual or potential losses to the Government and to borrowers from failure to maintain flood insurance."

This is an example of only one area of the over-all subsidy problem. In fact, 20 federal agencies have administered approximately 30 programs that have an impact on the barrier islands. During the past three fiscal years alone, development-oriented agencies have committed nearly a half billion taxpayer dollars to barrier island development projects. These Federal programs for barrier islands range from approximately 1/4 of the total dealing with preservation, 1/2 dealing with development, and 1/4 dealing with disaster relief.

Of the 500 million dollars, $300 million were invested by EPA, HUD, etc. in sewage treatment systems, a clear indication of the federal government's involvement in encouraging development in these islands. It is interesting to note that during the same period of time the flood insurance program paid $400 million in claims due to storm damage. Property losses from coastal erosion alone have been estimated at $300 million annually.

Every year that passes, 6000 acres of land on barrier islands become urbanized. Much of the development is subsidized through federal programs of the Army Corp of Engineers, the Environmental Protection Agency, the Department of Transportation, the Small Business Administration, and a plethora of other federal aid programs. Yet, while private interests and the federal government are blanketing barrier islands with roads, jetties, seawalls, and housing developments, nature is just as ardently shifting, eroding, modifying and defying our concrete design. To make matters even worse, the federal government ,through the flood insurance program and disaster relief funds, pays to rebuild communities on the same locations once they have been partially or completely destroyed by storms. Trying to protect what has been unwisely built imposes a high cost on taxpayers.

The aftermath of Hurricane Frederick has left a grim reminder to all of us of the cost of development in high-hazard areas along the coast. The cost of this storm was over 2 billion dollars in destruction. Despite the recent reminder of the dangers of locating in high hazard areas along the coast, rebuilding, subsidized by the taxpayer, goes on in the same areas.

At present, the Department of Transportation is granting a $32 million non-matching grant to the Alabama Highway Department to construct a bridge to Dauphin Island. The end result will be the redevelopment of most, if not all, of the areas destroyed by Hurricane Frederick last year. This amounts to a subsidy of over $20,000 per resident. Of course, this is only the tip of the iceberg, since figures weren't available for other federal agencies which contributed tax dollars in the form of Small Business Administration loans, flood insurance claims, disaster relief funds, and the probable EPA grant for a $3-5 million sewage system. All this is apparently being done by agencies which choose to ignore the President's executive orders on floodplains and wetlands.

The public is well aware of the cost of hurricanes in these high hazard areas.

However, our research has shown, in the case of Alabama, that even though they are likely to experience a major hurricane every 11.6 years, Alabama coastal districts are receiving disaster relief assistance every 3.8 years. This indicates that coastal areas are so developed in high hazard areas, despite flood insurance regulations to the contrary, that even maritime storms are causing damage and costing the taxpayer millions annually.

Additional costs to the public include:

- The federal share of funding for sewers, wastewater treatment, roads, bridges, shoreline stabilization, flood insurance and disaster relief on barrier islands ranges from 50% to 100%. The cost of these facilities and services on barrier islands is 2 to 3 times more on a per unit basis than the same facilities and services on the mainland.

* 78% of the national flood insurance claims for 1978 and 1979 were paid to coastal states at a rate four times the amount collected in premiums. Clearly, the public living in safe areas are forced to support those in high hazard areas with $3.00 for every $1.00 put out by high hazard area dwellers.

* Taxpayers are spending $65 million to replenish sand on Miami Beach. The Army Corp of Engineers proposes to spend $26 million on Ocean City, MD. This is despite warnings by coastal geologists that the sand will again disappear.

* The price tag to develop and keep people living in coastal hazard areas such as the barrier islands is enormous. That actual costs to the federal government are not readily available is in itself an indication of how little concern there has been in the past for responsible spending of our tax dollars.

Mr. Chairman, we want to thank you, Senators Tsongas, Weicker, and Jackson for taking the lead in the Senate in introducing S. 2686. We believe that the over-all concept of this bill is good and that it is an issue which needs to be addressed during the remaining session of the 96th Congress.

S. 2686 strikes at the very heart of the problem and although it does not address all the issues concerning barrier islands, it is a substantial beginning. The federal subsidy question must be resolved if we are going to in anyway begin to protect this resource.

We would like to comment briefly on some of the substantive aspects of this bill. The absence of an acquisition section is of concern to us. Acquisition does not necessarily denote federal takeover nor does it necessarily have to result in large federal expenditures. It does, however, add a dimension to the bill which will give the legislation more flexibility. It also will give the land owner a few more options in how she or he decides to handle the property. Direct federal acquisition is not the only avenue in this process. Certainly easements, tax incentives, and a host of other options should be considered. We would encourage the coordinated efforts for acquisition and safe-guarding the resource through a combination of federal, state and local government, as well as private organizations as stated in Section 1.

The establishment of a Barrier Island Council in Section 2, is not, in our opinion, set up to act in an effective manner. There are no funds to support an adequate staff which will be needed for such a Council to do an effective job. In addition, we would like its function to be more clarified so that it will not become an exemption vehicle rather than a conservation advisory forum for the protection of this resource. We would suggest that the Council, before advising on any exemptions from the federal subsidy cut-offs, must have documented costs to the taxpayer as well as the environmental damage to the ecosystem.

Finally, we have some major reservations with the broadness of the exemptions as written in Section 3(4). We believe that the intention of this section is well taken. However, many of the problems associated with the development of barrier islands exist because of the lack of restrictions on such areas as "public recreation" and "protection of the barrier island ecosystem". We support public recreation on these islands, but not to the extent that it would jeopardize the ecosystem. Assateague Island is a prime example of the conflicts concerning recreation and barrier islands. In the case of "protection of the barrier island ecosystem", it seems obvious to us that this provision, written as it is, allows the Army Corp of Engineers' activities, subsidized by the taxpayer, to go on as they always have without any constructive language or reform. Energy development and navigational development likewise should have some clarifying language.

Because of the newness of the issue and the relatively little time there has been to ensure that the maps have correctly included all the undeveloped areas on the barrier islands, we strongly urge that a provision be made to include new areas if they qualify as undeveloped in the future. Likewise, we are sympathetic to those areas that have been incorrectly designated as undeveloped and expect that they will be removed in an orderly fashion.

There is little doubt that some will make the argument that a more moderate approach should be taken by exempting some islands while protecting others. We submit to you that if the cut-off of federal subsidies does not remain largely intact, the true intent of S. 2686--which is to cut unnecessary spending and protect these valuable resources--will be lost. Many of the mapped barrier islands can not be developed due to size and lack of height above sea level and, therefore, in a sense are already protected. It is those islands that are most readily available for development that S. 2686 must deal with. To advocate exemption for these islands is an attempt to undermine the proposed cut-off of federal subsidies which is necessary for the ultimate success of addressing this issue.

Again, the Sierra Club would like to express our sincere thanks to you for addressing this most crucial problem affecting our coast.

Senator **Bumpers**. Thank you, Brock. Thank you, Bill. I don't have any questions of either of you. Your testimony has been excellent.

Incidentally, Brock, on the thing that was raised this morning about the economic interest of the people who own this property, I think your point is an offset to some of the testimony taken this morning, and if these people want to build there, that is still their prerogative, if they want to continue to own the property.

What we are getting at here is No. 1, we think it is probably improvident. We wouldn't take that right away, but there isn't any point in the U.S. Government subsidizing it certainly to the extent we have been subsidizing it, development, and that may be a perfectly equal tradeoff, so we will do a little more staff work on this and hopefully get this bill to markup sometime shortly.

Thank you very much, both of you, for coming. We stand adjourned.

[Whereupon, at 12:45 p.m., the hearing was adjourned.]

Senator BUMPERS. Thank you, Brock. Thank you, Bill. I don't have any questions of either of you. Your testimony has been excellent.

Incidentally, Brock, on the thing that was raised this morning about the economic interest of the people who own this property, I think your point is an offset to some of the testimony taken this morning, and if these people want to build there, that is still their prerogative if they want to continue to own the property.

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Thank you very much, both of you, for coming. We stand adjourned.

[Whereupon, at 12:45 p.m., the hearing was adjourned.]

APPENDIX

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

TESTIMONY OF CONGRESSMAN CHARLIE ROSE
OF NORTH CAROLINA
BEFORE SENATE SUBCOMMITTEE ON PARKS, RECREATION, and RENEWABLE RESOURCES

June 12, 1980

Mr. Chairman, I appreciate the opportunity to add my comments to S. 2686, a bill to direct the Secretary of the Interior to provide for the protection of the Barrier Islands.

I agree that there are many areas of scenic, recreational, historical, scientific, natural, archeological and cultural significance on lands classified as barrier islands that should be preserved. However, I seriously question the propriety of legislation that mandates withdrawal of all Federal aid and subsidies to certain arbitrarily-selected segments of this country.

While I do not object to the Federal government's stopping aid to waterlocked, desolate beaches that are undevelopable, many of the areas suggested to be encompassed by this bill have high development potential with little future risk to the Federal government if they are developed.

The establishment of a Barrier Islands Advisory Council would create another element of bureaucracy and expense. Many States already have competent coastal management offices. Ours in North Carolina is a recognized outstanding example and is becoming more effective the longer it remains in service.

I find this legislation to be highly discriminatory to the residents and property owners of barrier islands and to all those people who look forward to visiting these areas.

If we are to deny property holders on barrier islands from eligibility in the Federal Flood Insurance Program, for example, then we must take similar action for those who hold property in river flood plains and in other parts of the country. We should also take a serious look at disaster aid available for those who build along known earthquake faults and other precarious areas of this country. It is not fair or within democratic principles to withdraw the Federal helping hand to a certain selected segment of our population. What is fair and unfair for one should be so for all.

The legislation gives no serious consideration to the people and governments of barrier islands who have come to depend on Federal programs. Many of these barrier islands are located in economically depressed areas. The people living there depend on industries affiliated with recreation, such as construction of resort housing, tourism, marine sales and service, etc. for their livelihood. The orderly development of this area is vital to their economic and social well-being.

I know firsthand that if the coastal communities in my district in southeastern North Carolina are denied development, their economic health will be in jeopardy. This bill contains no provisions for economic assistance to these impacted coastal areas.

There are those who say tremendous sums of Federal monies will be saved by cutting all Federal programs to barrier islands. I say that barrier islands receive a small proportion of Federal assistance compared to other areas of this nation and that much return is received on this relatively small investment.

The purpose of this legislation can be accomplished just as effectively or more so by less drastic means through the individual States acting in a responsible manner. S. 2686 is an unnecessary and unfair piece of legislation which this country can well do without at this time.

American Land Development Association, 604 Solar Building, 1001 16th Street, N.W., Washington, D.C. 20036 Phone: (202) 659-4582

COMMENTS BY

AMERICAN LAND DEVELOPMENT ASSOCIATION

to the

SENATE COMMITTEE ON ENERGY & NATURAL RESOURCES

SUBCOMMITTEE ON PARKS, RECREATION & RENEWABLE RESOURCES

on

S.2686, BARRIER ISLANDS LEGISLATION

June 26, 1980

These comments are presented on behalf of the American Land Development Association (ALDA). The Association represents the nation's recreational, resort and residential real estate development industry. Our member companies develop, build and sell vacation homes, condominiums, planned unit developments, destination resorts, new and retirement communities, mobile home parks, recreational vehicle parks and campgrounds, and resort timesharing projects.

We have emphasized destination resorts, since that is the type of development which appears to be most affected by S.2686, the Barrier Islands legislation. Among the barrier islands which our members are involved in developing—either wholly or partially—are Padre Island, TX; Sanibel Island, FL; Sea Island, GA; Kiawah Island and Seabrook Island, SC; islands off the North Carolina, Virginia and Maryland coasts; and the Cape Cod area of Massachusetts.

ALDA has grave concerns about several provisions of S.2686, but none is more objectionable than Section 3, "Conservation of Barrier Island Resources." This section, in effect, bans federal expenditures or financial assistance under federal law, license or permit for "undeveloped barrier islands and undeveloped portions of barrier islands" identified by maps prepared by the Department of the Interior. Aside from our opposition to such a provision on general philosophical grounds, we are concerned that the Bill contains no criteria for judging the merits of present development vs. planned development on partially developed islands. Moreover, we think it is a mistake to automatically assume that circumstances are the same or even similar between islands with "undeveloped portions" (i.e. some portions are developed already) and those where no development has occurred.

The 300 barrier islands categorized by DOI are not identical in their suitability for development or their level of hazardousness. S.2686 nevertheless seeks to treat all 300 islands as if they were identical in physical characteristics and environmental sensitivity. Even the Secretary of Interior's report on barrier islands attempts to discriminate and distinguish the 300 islands as to their development potential, significance of natural resources and ability to withstand storms and tidal surges.

We are also concerned that the Bill contains no definition of "undeveloped." The ambiguity and wide breadth of this term leaves an enormous loophole for bureaucratic interpretation far beyond the intent of the legislation, in our opinion.

Many of our member firms have completed development of portions of a barrier island, but with long-range (10 to 20 years or more) plans to develop the remaining portions. At considerable expense in time, money and taxes, these developers have already initiated or completed numerous stages in the complex development process, e.g., road building, marina facilities, sanitation facilities, engineering, architecture, platting, etc. To cut off all federal expenditures or financial assistance would be disastrous for the development company, the local company which often depends heavily on the development for its very existence, and present owners themselves who could find their purchases (perhaps made years ago) virtually worthless.

Further, since full buildout of these projects may not occur for several years, developers may find themselves unable to obtain additional permits or approvals for dredging or construction of roads or other facilities in later phases of the subdivision. This dilemma could produce injurous side-effects not only for the lot buyers but for the island's ecological system as a whole. For example, the denial of all federal assistance for construction could mean that continued construction of a water treatment plant or central sewage system under an Environmental Protection Agency program would have to come to an abrupt halt. However, since the barrier islands are too fragile environmentally to handle septic tank installation, property owners could suffer sewage back-ups or be forced to dump their raw sewage into the bays and oceans.

Another major concern we have with this legislation is the absence of any review or appeal provision. Developers, local communities and individual buyers should be afforded due process—a means of appealing inclusion on the maps of the island(s) with which they are involved. In addition, there is no provision in this bill for condemnation proceedings, a right guaranteed by the 5th Amendment.

With the heavy reliance this bill places on the maps — and with the Secretary of the Interior being empowered to make "minor boundary revisions" (Sec.3.(c)) — we must point out the near chaos that has prevailed for many years over the accuracy of the maps which play such a key role in the National Flood Insurance Program. To the Subcommittee's credit, we understand that the maps originally proposed are now being revised due to apparent inaccuracies which have come to light since this legislation was introduced. Nevertheless, we are concerned with the whole concept of placing great reliance on maps prepared by a federal agency, and with the accompanying powers vested in the Secretary.

Finally, our Association questions the basic underlying purpose of the Bill. While we strongly support efforts by private individuals, governments or others to protect valuable and significant ecosystems, such as barrier islands, from unwise and despoiling development, such sweeping legislation as proposed in S.2686 would ruin many on-going barrier island development projects that enjoy the highest levels of environmental and safety planning.

We must question, for example, where such legislation as this might lead to next? Many proponents of the Bill have cited the inherent dangers from hurricanes to those who would inhabit a barrier island. While hurricanes do pose an almost constant threat to the islands, people choose willingly to reside there -- and even demand it -- just as others choose to live in the earthquake-prone areas of the West, mudslide areas in California, the so-called "tornado alley" of the Midwest and the Plain States, etc. Also, what of the inland areas subject to a fairly constant threat of hurricanes sweeping ashore from the Gulf of Mexico (even Arkansas residents might be included here)? In short, where do we draw the line in deciding where people may choose to live and which of our citizens should or should not receive federal funds?

ALDA must therefore oppose S.2686 as it is presently drafted. While we offer our services to the Subcommittee in seeking solutions to the concerns we have raised here, we believe a better course would be not to enact legislation at this time and instead allow further study of the desirability of a federal barrier island policy. More effort should be made, for example, to involve state and local governments, private industry (e.g. Barrier island development companies, realtors, homebuilders, etc.) and the public (e.g. landowners, conservation groups, etc.) in this process. In pursuing this course, we feel that greater attention should be focused on those barrier islands which are truly undeveloped, and which may merit "protection" from future development, rather than those which are already substantially developed or are part of a master plan for further development.

In conclusion, we leave the Subcommittee with this thought, put forth by one of our member developers whose project on Cape Cod is a showcase for sound ecological and environmental land use planning: "Modern man, by and large, wants to live near the water. The challenge we face is to weave our habitat into the coastal areas in a way that is environmentally sound."

Thank you for allowing us this opportunity to comment on S.2686. We would be pleased to try to answer any questions the Subcommittee may wish to forward to us, and to work with you to meet the challenge of formulating a sound and equitable policy for our barrier islands.

CARL M. FREEMAN ASSOCIATES
INCORPORATED
BUILDERS COMMUNITY DEVELOPERS

June 12, 1980

Senator Dale Bumpers
Chairman
Senate Sub Committee on
Parks, Recreation and
Renewable Resources
Room 3106
Dirkson Senate Office Bldg.
Washington, D.C. 20510

RE: S 2686 (Barrier Islands)

Dear Senator Bumpers:

We note that there is a 1.4 mile segment of Delaware seacoast that is recommended by the Department of Interior to be designated as a Class III undeveloped barrier island and, therefore, subject to the provisions of S 2686 and H 5981. Our company owns a parcel of ground within this segment of seacoast. We feel the Class III designation is improper and should be changed to Class I.

We have reviewed a copy of the report prepared by the National Park Service entitled "Undeveloped and Unprotected Barrier Islands of the United States" with particular attention to the evaluation (Ref. Code DE-03) recommending a Class III designation for the beach area including our property (see Attachment I). There are several discrepancies in the evaluation which we believe, if corrected, will result in our property and the surrounding area being redesignated Class I (developed areas) and, therefore, not subject to the provisions of S 2686 or H 5981. The discrepancies include the following:

1. The area in question is not a barrier structure according to criteria set forth in the Department of Interior report. A prominent Delaware geologist in 1976, described the subject area as " an extention of a geologically older and stable highland surface" (see Attachment II). The site is part of a headland and has no major bay located behind it.

CABIN JOHN CENTER
11325 SEVEN LOCKS ROAD, POTOMAC, MARYLAND 20854
(301) 983-0400

Further, there are no wetlands of significance within the designated area. The Department of Commerce Office of Coastal Management, using Department of Interior information, has not acknowledged the presence of wetlands in the immediate vicinity of the subject area (see Attachment III). The wetlands which did exist to the west of the shorefront in the vicinity of Fresh Pond were reportedly drained by the owner, William P. Short in 1974. There is a drainage ditch within the subject area which parallels the shorefront and has control structures at either end to prevent tidal infiltration. We do not believe this drainage ditch can be considered an important natural channel (see Attachment IV).

2. The evaluation prepared by the National Park Service indicates that the subject area is owned by one individual. There are, in fact, seven distinct major parcels and a subdivision involving a total of at least 30 separate owners along the 1.4 mile shorefront that is designated Class III. There are additional individual holdings in the area to the west of Highway 14 (see Attachment V).

3. The National Park Service represents the subject area to be undeveloped. In fact, one subdivision presently exists near the middle of the beach front area designated Class III. This subdivision (Sea Del) received Sussex County approval in 1976 and began development in 1977. There are presently 17 existing homes in this subdivision with 28 additional lots planned for development. Another subdivision (Bethany Dunes), which is adjacent to Sea Del, recently received site plan approval from Sussex County for construction of 34 homes. A portion of the land in the subject area immediately to the west of Highway 14 is the site for facilities of the Sussex Shores Water Company.

4. We question the acreages presented in the property description prepared for the National Park Service. This information should be verified with William P. Short (P.O. Box 169, Bethany Beach, Delaware 19930),

who has extensive knowledge of the subject area. Mr. Short was listed in the National Park Service evaluation as a contact for the information on the Delaware coastal area. He has advised us that he was never contacted by the investigator who evaluated the subject area for the National Park Service.

In summary, it is our belief that the unit known as Bethany Beach (Ref. Code DE-03) does not qualify as a Class III area because it has been under development since 1977 and it is not a barrier island as defined by the Department of Interior.

It should also be noted that there are already significant Federal and State holdings along the Delaware and Maryland seacoast including Cape Henlopen State Park, Delaware Seashore State Park, and Assateague National Seashore which appear to comprise approximately 75% of the shoreline between Henlopen Point, Delaware and Chincoteague, Virginia (see Attachment VI). Eighteen of the twenty-six miles of beach front in Delaware are already under the control of State and municipal agencies. With so much of the coastal area in preservation, it is difficult to understand why a 1.4 mile segment of seacoast in the Bethany area was recommended for Class III status.

We request that this letter be made a part of the hearing record on S 2686 (Barrier Islands). We also request that we be placed on the mailing list for any materials distributed that pertain to this legislation.

Sincerely,

Norman Dreyfuss
Executive Vice President

ND/ll
Attachments

cc: Senator Joseph Biden, U.S. Senate
Senator William Roth, U.S. Senate
Honorable Thomas Evans, U.S. House of Representatives
Cecil D. Andrus, Secretary of the Interior
Robert Kutler, Senate Sub Committee on Parks, Recreation and Renewable Resources
Dale Crane, House Sub Committee on National Park and Insular Affairs
William P. Short
Eugene Bayard

ATTACHMENT 1

DELAWARE

Name of Unit: Bethany Beach **Reference Code:** DE-03

County: Sussex **Congressional District:** AL

SUMMARY EVALUATION: The remaining, small undeveloped portion of Bethany Beach has very high value for wildlife habitat. The area is slated for imminent intensive development by its one owner, which will significantly compromise existing natural values. Information on shoreline changes - critical for evaluating suitability for permanent use and occupancy is not available.

DESCRIPTION:
Total Area of Unit: 872 Acres

Land Use/Land Cover	% of Total
Urban or Built-up Land	40%
Agricultural Land	0%
Rangeland	0%
Forest Land	0%
Water	0%
Wetland	42%
Barren Land (Sand Dunes)	18%

Undeveloped/Unprotected Land (Category III):
Fast Land 136 Acres Wetland [illegible] Acres
Interior Waters 0 Acres

Beach Length of Entire Unit: Total 1.6 Miles
Undeveloped/Unprotected 1.4 Miles

Land Ownership: Federal: 0 Acres
Non-Federal Government: 0 Acres Private: 872 Acres

ACCESS: Access to the area is by paved road, boat, or plane.

Nearest Standard Metropolitan Statistical Area(SMSA): Wilmington, Delaware
Shortest Road Distance from Unit to SMSA: 85 Miles
Population of SMSA in 1972: [illegible]

PHYSICAL CHARACTERISTICS:
Type of Barrier Island Structure: Single Dune Ridge Barrier

Geological/Hydrological Features: Information is currently unavailable.

Significance Rating: N/A

Natural Hazards:
Storm Probability(% chance of occurrence in a given year):

Great Hurricane(Winds >131 MPH)	0%
Hurricane(Winds ≥ 74 MPH)	3%
Tropical Storms	N/A%

Vulnerability to Major Storm Damage: Low
(Annual Storm Intensity Factor = 0.05)

Subject to effects of potentially severe extratropical storms during winter and early spring months.

Flooding:

Flood Occurs Once Every	Stillwater Height of Storm Surge	% of Category III Fast Land Flooded
10 Yrs.	N/A	100%
50 Yrs.	N/A	100%
100 Yrs.	N/A	100%

Severity of Flood Hazard: Very High
The last major flood (1962) inundated the area; the dunes were rebuilt.

Shoreline Changes (Category III Areas Only):

Information is currently unavailable.

Summary of Island Stability: The area is subject to flooding.

RESOURCE VALUES
Fish & Wildlife: This area supports an abundance of small mammals (e.g., mice, rabbits), shorebirds and waterfowl, and provides excellent habitat for migrating waterfowl. Particularly significant are the peregrine falcon, bald eagle, and a major colony of osprey. Shellfish and sport fish are also abundant near the ocean shoreline. near the ocean shoreline.

Significance Rating: High

Special Ecological Features: Numerous fresh water and brackish water marshes occur on the bayside of the area.

Significance Rating: Moderate

Recreation Potential: Because of excellent access, relatively close proximity to urban centers, and good natural resources, the area has considerable potential for both high-intensity recreation and resource-oriented, low-intensity recreation (such as swimming, sunbathing, fishing, birdwatching, nature walks, etc.) Non-intensive activities such as environmental education, nature studies, interpretation would also be ideal on this site.

Significance Rating: Moderate

Cultural Resources: Information is currently unavailable.

Significance Rating: Low

Miscellaneous Comments: This is an important natural area in a rapidly urbanizing portion of the coast. Existing resource values are severely threatened by planned intensive development.

THREATS TO RESOURCE VALUES

Development: This area is entirely owned by one individual who has expressed his intention to fully develop this remaining, small undeveloped portion of the beach (Sea Colony North). His plans call for the construction of high rise buildings and individual homes. Although an ownership dispute with the State of Delaware exists, the private landowner intends to move ahead with his projects as planned.

Significance Rating: Very High **Imminence:** Very High

Shoreline Manipulation: Man-made dunes are present on much of this site. Plans for future manipulation are not known.

Significance Rating: Moderate **Imminence:** Moderate

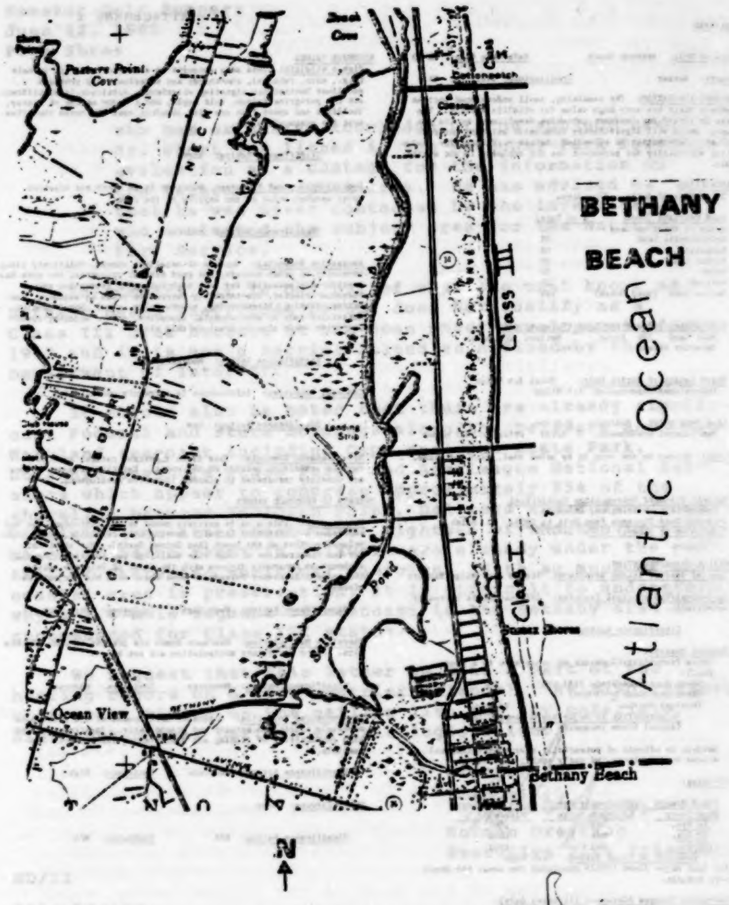
Environmental Pollution: Intensive development of the area could adversely affect the estuary and ground water. Impairment of the high productivity of fishing and shellfishing resources is also possible.

Significance Rating: Moderate **Imminence:** High

Other Threats: None

Significance Rating: N/A **Imminence:** N/A

Preparer: [illegible] Date: 1/80 Revised 3/19/80


BETHANY
BEACH
Atlantic Ocean
Class III
Class I
Pasture Point Cove
Beach Cove
NECK
Slough
Landing Strip
Salt Pond
Ocean View
BETHANY
Sussex Shores
Bethany Beach
N
0
1 MILE

ATTACHMENT II

Department of Geology
101 Penny Hall
University of Delaware
Newark, Delaware 19711

December 10, 1976

Mr. James A. Tevebaugh, A.I.A.
Senior Associate
Edward H. Richardson Associates, Inc.
Consulting Engineers
Richardson Building
910 S. Chapel Street
Newark, Delaware 19711

Dear Mr. Tevebaugh:

As discussed in our conversations of December 7 and 8, 1976, I am pleased to comment on the geological situation of the proposed site of "Sea Colony North", a plan for development in the coastal zone to the north of Bethany Beach, Delaware and south of Indian River Inlet. These comments are based on my surface and subsurface geological studies of the Delaware coastal zone and coastal processes over the past 12 years. I have specifically studied the geology of the area in question in terms of its subsurface geology and the coastal processes evident over the past ten years.

The specific site in question, Sea Colony North, is located between Indian River Inlet and Bethany Beach, Delaware. It is located south of a coastal area known as "Cotton Patch Hill" and east of a low-lying marshy area known as "Fresh Pond" between the dual highway Route 14 and the Atlantic littoral zone. This 24 acre site lies in part along some of the highest coastal dunes in the region between Indian River Inlet and Bethany Beach. In addition, it is in one of the more stable areas of the Delaware Atlantic coast, from Cape Henlopen south to Fenwick Island. This is for several reasons. First, and most important, the site does not lie on an open Atlantic coastal washover barrier. Rather, it is in the interface zone between the higher coastal plain that merges with the Atlantic Ocean at Bethany Beach and the low-lying coastal barrier north of Cotton Patch Hill. Specifically, the site is on an extension of a geologically older and stable highland surface that lies to the west and is part of the Cedar Neck complex of ancient barrier ridges from a time when sea level lay at a much higher level than present, probably over 100,000 years ago. Thus, the area from Cotton Patch Hill southward to Bethany Beach can be considered to be sited in an area of a more stable geological substrate. In addition, the coast-beach itself is on the up-littoral drift direction from the Indian River Inlet jetties. Accordingly, it benefits from the sand entrapped to the south of the jetties in the beach area.

The coastal zone in the area in question is undergoing an average erosion of slightly less than 2 ft per year averaged over a century and a half of mapping. However, these erosion rates are highly variable and, over short term intervals, and probably caused by high intensity events such as hurricanes or northeasters, the rates have been much higher for short periods of time. On the other hand, the rate of erosion as compared with the overall rates of erosion of the Atlantic coast of Delaware is minimal.

The plan, as presented to me in your "sketch plan for rezoning" and as related to positioning along the shoreline on a Department of the Army Corps of Engineers map "Delaware Coast Beach Erosion Control and Hurricane Protection" Inv. No. DACW61-73-B conforms to all zoning regulations that I am aware of. In addition, it appears to be a well conceived plan, with a reasonable setback from the existing coastal dunes. Further, as you explained to me, the building elevations will conform with the requirement of exceeding in elevation the estimated flood heights anticipated in a 1 in 100 year coastal storm surge flood event.

In view of the fact that the planned site has a reasonable setback from the shoreline and is behind a relatively high coast parallel dune field and you have accounted for possible storm flooding from the Indian River Bay side of the development, I feel the site to be well chosen and the actual building proposal to be optimally planned in terms of the existing topography.

As we all know, dealing with statistics and coastal erosion is a well understood and yet not really predictable event in terms of true precision of rate of erosion in any one particular hurricane or northeaster. As stated above, I do agree that the proposal has a proper setback and is in good order. As a personal recommendation, however, I would recommend to the developer that he allow himself some additional "insurance" against major storm erosion through the dune field by setting the entire project back another 20-50 ft. This is not, in my opinion, a required or critical matter. However, it would definitely extend the long term lifetime of the project and decrease that extremely rare but possible exceptional type of storm that might remove the entire protective dune as presently relied upon in the plan. Esthetically, I feel that it would not significantly alter the plan. This latter is merely offered as advice and not meant in any way to detract from the plan as it was presented to me.

With the presence of the Bethany Beach highland surface of older sediments, the positioning of this site on the marginal northerly edge of these highlands, south of the northerlymost limit at Cotton Patch Hill, and the fact that the site is not on the overwash barrier which begins just north of Cotton Patch Hill, I conclude that the proposal is a rational and reasonable plan for coastal development of private properties. Please let me know if I can provide any further, more detailed information for you.

Yours very truly,

John C Kraft

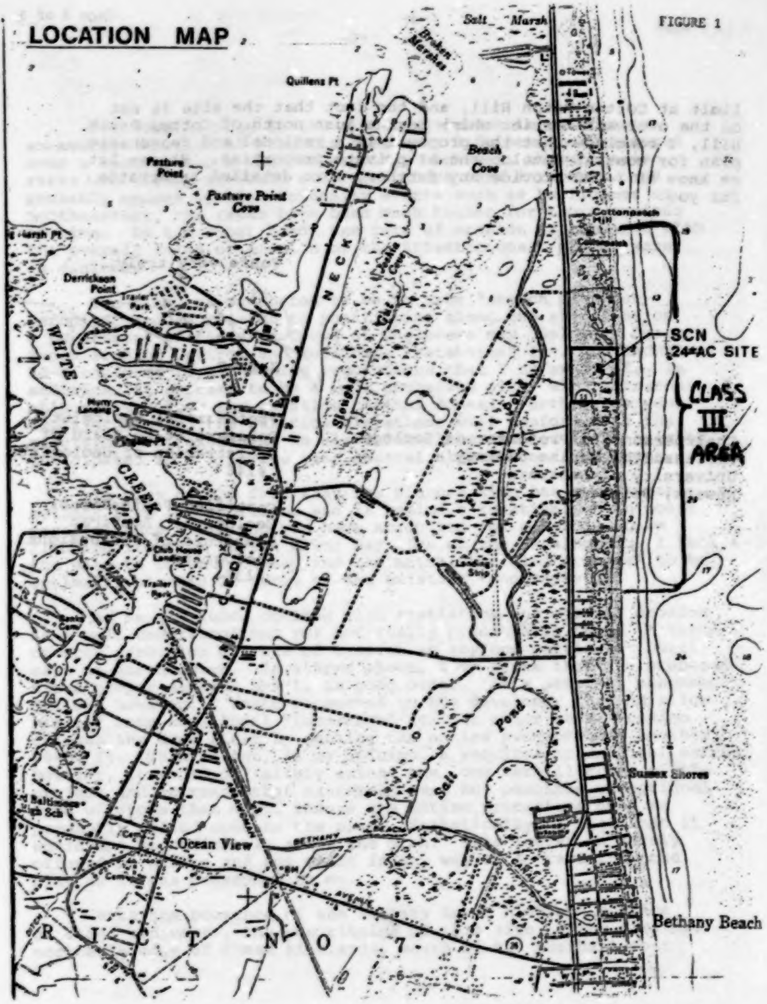
John C. Kraft

Professional Geologist:
Delaware State Board of
Registration of Geologists
#146

Certified Professional
Geologist: American
Institute of Professional
Geologists
#1354

Chairperson and Professor of Geology
Professor of Marine Geology
University of Delaware
Newark, Delaware

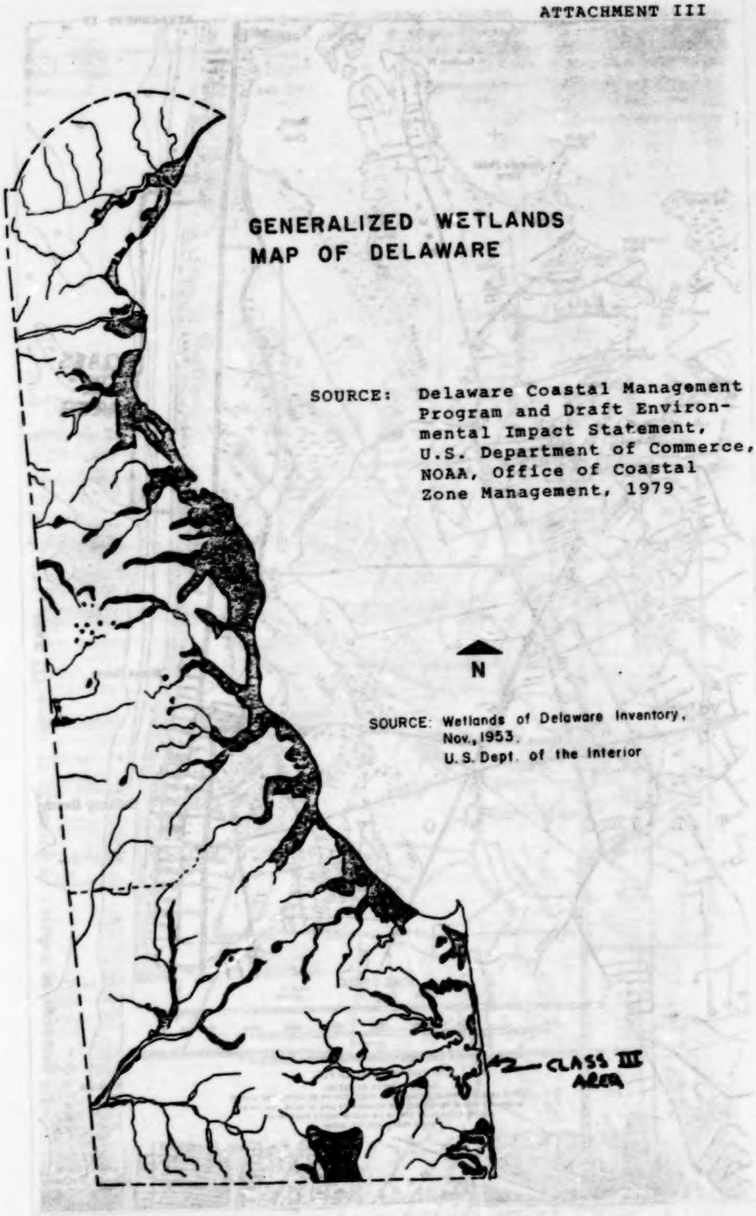
FIGURE 1



LOCATION MAP

Salt Marsh
Broken Marshes
Quillens Pt
Beach Cove
Pasture Point
Pasture Point Cove
Marsh Pt
Derrickson Point
Trailer Park
WHITE
CREEK
NECK
Slough
Cottonpatch Hill
SCN
24-AC SITE
CLASS
III
AREA
Club House Landing
Trailer Park
Landing
Salt Pond
Sussex Shores
Lord Baltimore High Sch
Ocean View
BETHANY
AVENUE
Bethany Beach
R I C T N O 7

ATTACHMENT III

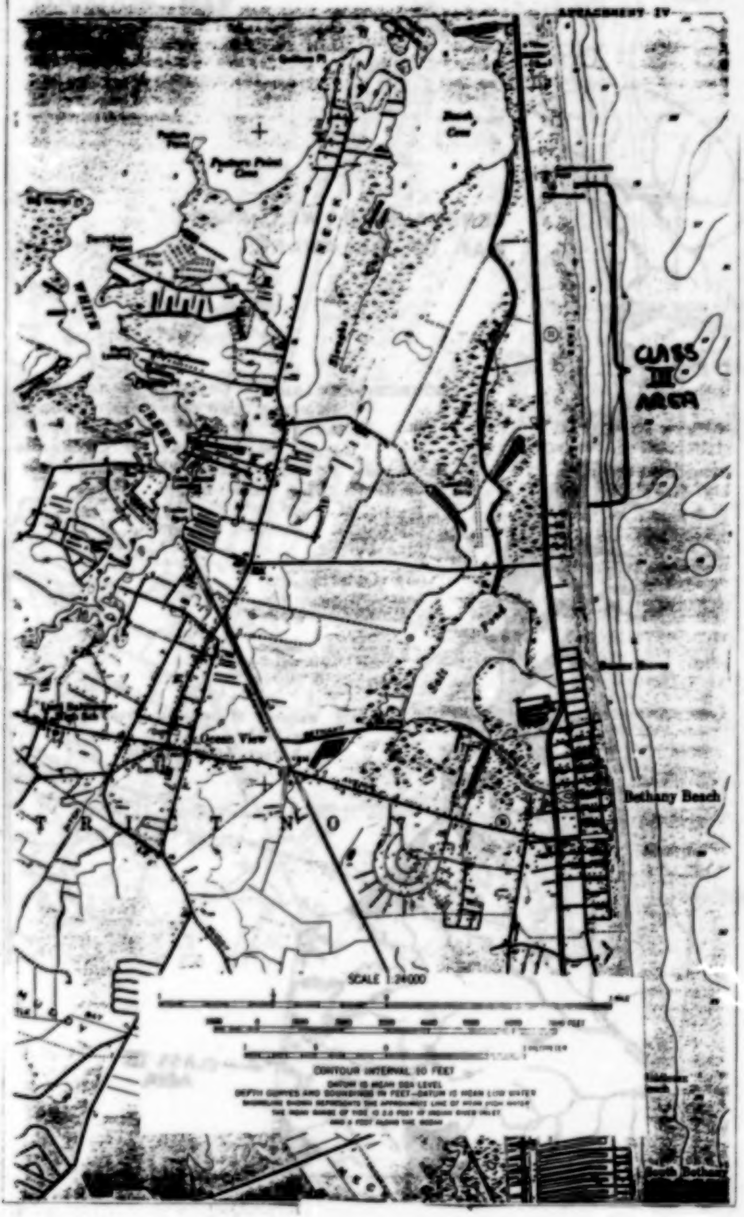


GENERALIZED WETLANDS MAP OF DELAWARE

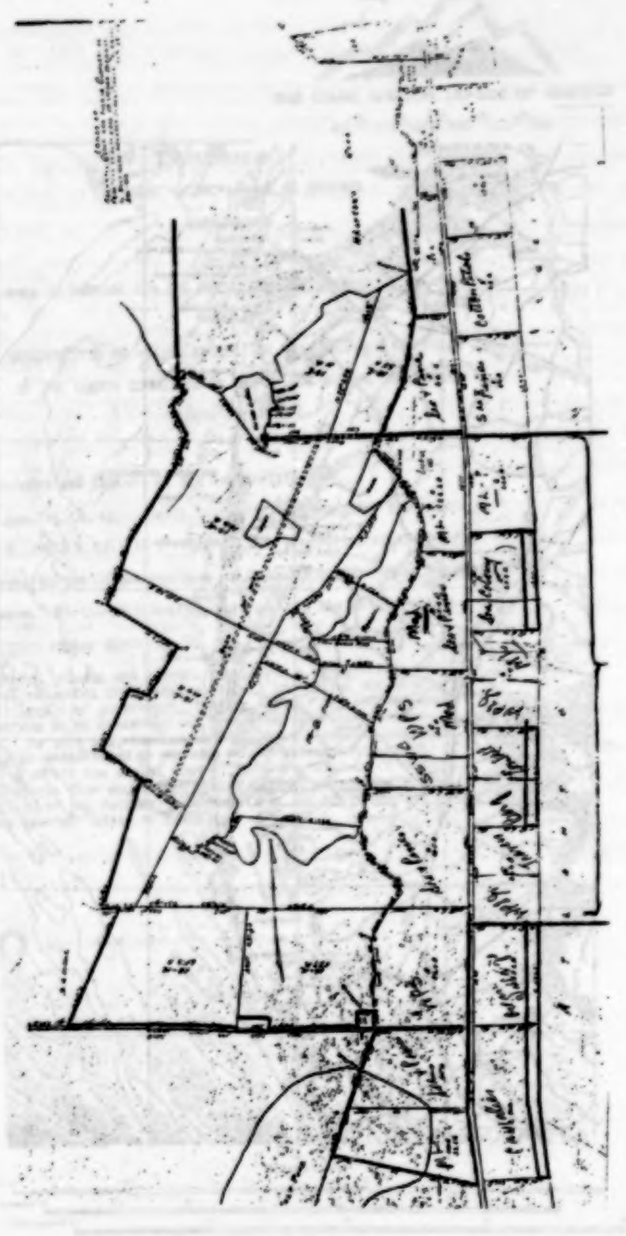
SOURCE: Delaware Coastal Management Program and Draft Environmental Impact Statement, U.S. Department of Commerce, NOAA, Office of Coastal Zone Management, 1979

SOURCE: Wetlands of Delaware Inventory, Nov., 1953.
U.S. Dept. of the Interior

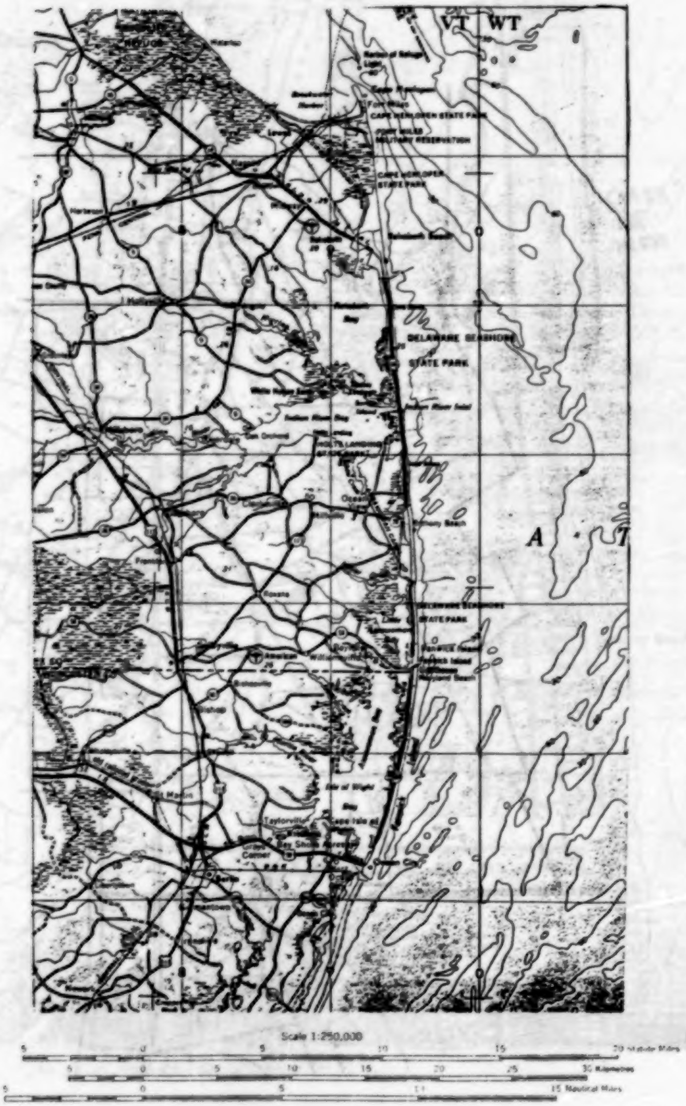
ATTACHMENT IV


CLASS III AREA
Green View
Bethany Beach
South Bethany
CREEK
NECK
SCALE 1:24000
CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER

ATTACHMENT V



LOCATION OF PARCELS IN VICINITY OF CLASS III AREA


VT
WT
CAPE HENLOPEN STATE PARK
FORT MILES
MILITARY RESERVATION
CAPE HENLOPEN
STATE PARK
DELAWARE SEASHORE
STATE PARK
DELAWARE SEASHORE
STATE PARK
A
T
Scale 1:250,000
5
0
5
10
15
20 Statute Miles
5
0
5
10
15
20
25
30 Kilometres
5
0
5
10
15 Nautical Miles

THE IZAAK WALTON LEAGUE OF AMERICA
INCORPORATED

STATEMENT OF

THE IZAAK WALTON LEAGUE OF AMERICA

CONCERNING

S. 2686

A BILL TO PROVIDE FOR THE PROTECTION OF THE BARRIER ISLANDS

TO THE

SUBCOMMITTEE ON PARKS, RECREATION AND RENEWABLE RESOURCES
OF THE SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

JUNE 12, 1980

Dear Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to submit testimony for the record in support of S. 2686, a bill to provide for the protection of the barrier islands.

The Izaak Walton League has been in favor of preserving our nation's coast for many years. At its 1976 National Convention, the League passed a policy resolution that states that:

> ...barrier islands and beaches constitute a unique class of natural resources that require special protection and treatment by all levels of government if their natural and recreational values are to be conserved and protected for future generations. To this end, the League urges that a binding national policy be established by statute or executive order, which would prohibit the use of federal funds or issuance of permits for projects that would lead to the adverse alteration or destruction of the recreational scientific and environmental values of any barrier island or beach.

National Office Suite 806, 1800 N. Kent Street, Arlington [illegible]

The League's resolution directly supports Section 3 of S. 2686. We support this section not only because of the protection it would afford natural resources associated with barrier islands, particularly fish and wildlife habitat, but also because of the great savings to the federal taxpayer provided by this section. As was thoroughly documented in the hearings on this bill, heavy federal subsidies are now encouraging development on barrier islands through a long list of federal programs in the Small Business Administration, Department of Transportation, Federal Flood Insurance Administration, Disaster Response and Recovery, Farmer's Home Administration, and the Corps of Engineers.

Some of these programs promote investment in construction, for example low-cost loans from the Farmer's Home Administration and Veterans Administration, or waste water treatment facility construction grants from the Environmental Protection Agency. Federal Flood Insurance and disaster relief assure an offset to loss from storm damage, even for unwise construction in high hazard areas. Corps of Engineers beach nourishment projects protect erosion prone sites at the cost of many millions of dollars, and for only a temporary benefit. Such subsidies provide a double loss to the nation, a waste of federal monies and destruction caused by development to valuable fish and wildlife habitat.

S. 2686 would go a long way toward preventing this destruction of barrier island natural values but would not totally prevent it. For this reason, we support H.R. 5981 legislation which would authorize the Department of Interior to acquire undeveloped acreage of undeveloped and partially developed islands. Acquisition is an essential aspect of Barrier Island protection because even if federal subsidies are removed, ecologically sensitive areas of barrier islands will still be subject to development with private monies.

It is commendable that S. 2686 applies to partially developed as well as undeveloped barrier islands. Undeveloped areas on partially developed islands are often even more susceptible to development than totally undeveloped islands. Island roads, utilities and waste disposal facilities are already in place and can be easily extended to the undeveloped areas, while on a totally undeveloped island, all of these facilities must be built.

In reviewing the sites delineated in the National Park Service's Barrier Island Inventory, it is apparent that certain areas are of a higher national significance than others. The League has examined the undeveloped areas and established a preliminary list of priority areas for acquisition. In drawing up the list, our considerations were the ecological and wildlife value of the area, the severity and imminence of threats to the quality of its natural values, and the feasibility of acquisition. Steps toward the preservation of these areas should be taken as soon as possible.

One area which appears on our list, Shinnecock Beach (East and West) is not included in the National Park Service's Inventory. The League feels that this is an oversight and should be corrected.

The priority list and a brief description of each of the areas is attached to this testimony as an appendix. The information for these descriptions was gathered from local sources, state agencies, private organizations, informed citizens and relies on the fact sheets provided by the National Park Service for H.R. 5981.

Respectfully submitted,

Marni Holbrook

Marni Holbrook
Environmental Associate

Attachment

Appendix

PRELIMINARY LIST OF PRIORITY BARRIER ISLAND AREAS FOR ACQUISITION

Massachusetts
Cuttyhunk Island
Muskeget Island

New York
Shinnecock Bay Beach (East & West)

New Jersey
Seven Mile Beach

Virginia
Assawoman Island

South Carolina
St. Phillips Island
Bay Point Island
Prichards Island
Little Capers Island
Daufuskie Island

Georgia
Little Tybee Island

Florida
Big Talbot Island
Hutchinson Island
Lovers Key Group
Cape Romano
Rookery Bay Group
Bocilla Island.

Alabama
Dauphin Island

Mississippi

Deer Island
Round Island

Louisiana
Timbalier Island
Isles Dernieres (Trinity Island)

Texas
South Padre Island
Matagorda Peninsula

Cuttyhunk Island - Massachusetts

Values: Terrestrial habitats and fresh and saltwater ponds on Cuttyhunk Island provide a haven for colonially nesting waterbirds, migrating birds, waterfowl and others, some of which are rare species. Shellfish beds are found in Cuttyhunk Pond. Birds nesting in the area include black-crowned night heron, snowy egrets, terns and numerous other shore and wading birds.

Cuttyhunk Island is part of the Elizabeth Island chain which is virtually unaltered. Considered a diverse ecosystem, the island's terrestrial environment includes forest, swamp, grassland/dune communities, and bog and tidal saltmarsh/mud flats. Rare plant species and significantly diverse physiography are found on the island. Cuttyhunk Island has potential Natural Landmark status.

This island is the site of the first English settlement in America. It was established 5 years before Jamestown and 18 years before Plymouth.

Threats: There is a small fishing village on Cuttyhunk Island which has 50 year-round inhabitants and approximately 400 seasonal inhabitants.

The only restrictions on building on the island are state development limitations on dunes and wetlands.

Outlook: 577 of the 626 acres of land is privately owned.

Muskeget Island - Massachusetts

Values: Muskeget Island is probably the most magnificent barrier feature in Massachusetts, containing important ecological resources. The island is richly endowed with fish and wildlife populations.

Muskeget Island provides a habitat for 15 species of waterfowl, 11 species of shorebirds, 6 species of marsh birds and 7 species of upland game. In addition, approximately 100 species of birds use the island as a migration habitat. The endangered peregrine falcon and bald eagle are occasional visitors.

This island has the unique qualities required to obtain Natural Landmark status. The diverse ecosystem includes a tidal saltmarsh, mudflats, grassland, dune communities and thicket vegetation.

Threats: Two small cottages used as a hunting camp are located on the island. Any further recreational or residential activity could diminish the island's value as a wildlife refuge.

Outlook: Muskeget Island is highly valued by conservation groups in Massachusetts.

Shinnecock Bay Beach (East and West) - New York

Values: The wetlands and spoil islands on the bay side of the barrier support large populations of water and shore fowl. The USFWS found roseate and least terns nesting in the area as well as oyster catchers. There are only a few houses in this stretch of land.

Threats: There is constant pressure from urban sprawl to develop this oceanside land. The major delaying factor is the absence of water lines to the beach.

Outlook: This area was not included in the NPS's barrier islands inventory. Local residents feel that the area should be added to the list.

Seven Mile Beach - New Jersey

Values: This area provides habitat for shorebirds and waterfowl, and is a stopover for peregrine falcons and warblers. Seven Mile Beach also supports two least tern colonies and a common tern colony.

The offshore area fosters a substantial clam population and has been closed by the state of new Jersey to shellfishing in order to create a surf clan sanctuary.

Threats: The town of Stone Harbor intends to expand by authorizing the building of a single family homes in this class III area. Construction of a new parking lot is planned as well as a new residential block at the southern margin of the point in the area of best dune habitat.

There is shorline manipulation consisting of a sea wall and several groins along the northern third of the class III area. One of the groins is causing erosion near a least tern colony. Continued development of the groin field in conjunction with the expansion of residential development is likely.

Assawoman Island - Virginia

Values: Assawoman Island provides diverse habitat for colonially nesting shorebirds, migratory birds, waterfowl, terrestrial avifauna, mammals and rare and endangered species -- namely brown pelican, bald eagle, osprey and peregrine falcon.

Significant features on this island include fresh water habitats and diverse estuarine ecosystems. Assawoman Island has been listed on the National Register of Natural Landmarks.

Threats: Oil Interests have been considering the island as a potential pipeline crossing which would have adverse effects on the area. There is also a threat from potential overuse by visitors.

County Public health and general subdivision regulation are the only land-use controls that regulate development on the island.

Outlook: Assawoman Island is all privately owned.

St. Phillips Island - South Carolina

Values: St. Phillips Island is the richest and most diverse wildlife habitat of all the barrier islands in South Carolina. There are alligators, hawk snails, osprey and loggerhead turtles on the island. St. Phillips also has a unique plant community of mature magnolia maritime forests.

Threats: Ted Turner currently owns the island. The previous owner wanted to develop the island and had obtained a controversial bridge permit, but Turner has not announced any plan to pursue the development potential of the island.

Outlook: The South Carolina Wildlife Department recommended that we include Bay Point Island in any actions that are taken to preserve St. Phillips Island. It is located at the southern end of St. Phillips. The two islands are separated by a creek. Bay Point Island is currently on the market.

St. Phillips Island is very popular with the public. It is widely known and valued. Efforts to protect it would probably be supported.

Bay Point Island - South Carolina

Values: Bay Point's marshes provide rich habitat for a wide variety of fish, shellfish and wildlife. The brown pelican, alligator, osprey, loggerhead turtle and river otter are all identified for protection on this island.

Threats: Bay Point Island is currently utilized as a family-oriented vacation spot. Any further development would adversely affect the pristine nature of the island.

Outdook: Bay Point Island is currently on the market.

Prichards Island - South Carolina

Values: Prichards Island is a high priority area of the South Carolina Wildlife Department. It is relatively pristine and supports a variety of fish and wildlife. The backbay system provides an excellent habitat for oysters and other shellfish.

Threats: The island was just sold to a private interest. It is not known what the new owners plan to do with the island.

Outlook: As part of the St. Phillips Island Complex, Prichards Island is well-known. Public sentiment is in favor of preserving this island.

Little Capers Island - South Carolina

Values: Little Capers Island has a well-developed marsh system which supports a variety of fish, shellfish, and wildlife.

Threats: This area is used as a fishing camp with several trailers and small houses. This type of use has not harmed the natural resources of the island.

Outlook: This island is all privately owned.

Daufuskie Island - South Carolina

Values: Daufuskie Island is rich in Negro culture and supports heavy inshore fishing. The island is inhabited by 50-100 families which live on the southern end. The northern end is undeveloped and only slightly affected by the residents. The beaches are undisturbed.

Daufuskie is very isolated from the mainland because of the limited access. Small boat and a weekend ferry are the only means of transportation to and from the island.

Threats: A developer has all but closed a deal on 1,500 acres on the northern end of the island. He has plans for "limited development".

The State Office of Parks, Recreation and Tourism was interested in purchasing the northern part of the island too.

Outlook: For the most part, the residents are against development and would like the island to be maintained in its present condition. They may prefer acquisition to development. The general public is overwhelmingly in favor of preserving the island and its culture.

Little Tybee Island - Georgia

Values: Little Tybee Island is a large undeveloped barrier island with highly diverse habitats. Dune ridges with coniferous trees provide nesting areas for great egrets, great blue herons, cattle egrets and osprey. Saltmarshes provide food and habitat for fish, shellfish and wading birds. Over 205 species of birds have been recorded on neighboring Wassaw Island but no exact count is available for Little Tybee Island. These two islands have similar habitats.

The various vegetation types, rare and endangered wildlife species, and pristine conditions make Little Tybee Island a potential addition to the National Register for Natural Landmarks.

__Threats__: There is a potential for phosphate mining in this area. This would endanger the valuable resource values of the island.

Sea Island Corporation reportedly is interested in Little Tybee Island for development purposes.

__Outlook__: The entire island is owned by Kerr McGee Corporation. Kerr McGee is asking a price of about $5 million.

Big Talbot Island - Florida

__Values__: Big Talbot Island is a rich and diverse bird habitat. The endangered southern bald eagle and American peregrine falcon and the rare eastern brown pelican have been sighted on the island.

__Threats__: The largest threat to the island is from development. The northern part of the island is owned by developers while long-time residents own the rest of the island.

__Outlook__: Big Talbot Island was scheduled to be purchased by the state as an Environmentally Endangered Area. The procedure was interupted by an FBI investigation of the head of the state DNR. Recently, the EEL program has been replaced by a Conservation and Recreation Land Fund which establishes a different set of criteria for land to be acquired by the state. Namely, the criteria include areas of recreational, historical and archeological significance as well as areas of wildlife significance as qualified for state acquisition.

Because of this change in criteria, the state is discarding its old list of priority areas for acquisition and soliciting new recommendations for areas to be considered. There is no guarantee that areas like Big Talbot Island and Hutchinson Island which were priorities for the EELP will remain as high on the list of priorities for the Conservation and Recreation Land Program.

Hutchinson Island - Florida

Values: Hutchinson Island provides a highly diverse bird habitat for egret, heron, ibis, pelicans, cormorant, anhinga, stork, terns, gulls, plover, and the endangered salt marsh snake. It is also a habitat for endangered sea turtles, manatees and alligators. There is a state-owned turtle nesting site on the island.

Threats: Hutchinson Island is 23 miles long. The southern most 7 miles are in Martin County and the northern 16 are in Lucie County. There is a nuclear power plan near the midpoint of the island. Three bridges connect the island with the mainland. One is in Lucie County and two are in Martin County.

Approximately one third of the section in Martin County is undeveloped. A larger percentage of the land in Lucie County is undeveloped. There are six miles of undeveloped land just south of Ft. Pierce. 385 acres of this land is owned by a Mr. Hoyt of Washington, D.C. He is currently looking for a buyer.

Gulf Oil Corporation has purchased a major portion of the island. There are two condominium development projects under construction: one on the northern part and one on the southern part. These two developments along with the rapidly spreading small-scale development occurring in Martin County pose a serious threat to the fish and wildlife associated with Hutchinson Island.

Outlook: The state of Florida considered Hutchinson Island an environmentally sensitive area under the Environmentally Endangered Lands Program (EELP). This program has been replaced by a Conservation and Recreation Land Fund which establishes different criteria for land to be acquired by the state. Namely, it includes areas of recreational, historical and archeological significance, as well as areas of wildlife significance as qualified for state acquisition. Because of this change in criteria, the state is discarding its old list of priority areas for acquisition and soliciting new recommendations for areas to be considered. There is no guarantee that areas like Big Talbot Island and Hutchinson Island which were priorities for the EELP will remain so high on the list of priorities for the Conservation and Recreation Land Program.

The local sentiment toward the preservation of Hutchinson Island is varied, but there are those who favor preservation over development.

Lovers Key Group - Florida

Values: Lovers Key Group is comprised of two islands, Inner and Lovers Key in pristine condition. These islands are accessible only by boardwalk and jitney service. The only structures on Lovers Key are those related to the county park.

There is a mangrove forest and salt marsh on the island which have highly productive oyster beds and provide an excellent feeding ground for fish, shellfish, and wading birds. Loggerhead turtle and roseate spoonbill nests have been reported on the island. Lovers Key contains habitat for fiddler crabs and feeding areas for many shorebirds including terns, gulls, and egrets.

Threats: There are three owners involved; a developer, Floyd Luckey owns land on both Inner and Lovers Key as well as neighboring Black Island. He is planning to build a resort on Black Island and has obtained the necessary permits. Lovers Key Corporation owns 135 acres on the two islands and hopes to construct about 700 residential units there. The county owns Carl Johnson Park which is located at the southern end of Lovers Key.

A bridge that would connect the northern end of Lovers Key to Black Island and the Bonita Causeway was authorized in 1973 but was never built because of the recession. There has been renewed interest in building this bridge to facilitate access to the island. The state Department of Environmental Regulation has said that it intends to issue a permit for its construction.

County Commissioners have adopted a resolution supporting legislation that would appropriate more money for outright acquisition of barrier islands.

In December, the Commissioners adopted a resolution to acquire the remaining Gulf beach on Lovers Key and to join private developers in a mutually cooperative arrangement for the overall planning of the area. The Commissioners are just taking the first steps toward hiring architectural and engineering consultants to prepare site development plans and applications for regional, state, and federal permits.

Two plans for development are being considered. One proposal would extend a road along the island and develop a large recreation/marina/beach complex. Another proposal would create a large recreation development on the island.

Outlook: There has been a controversy over the future of Lovers Key for the last eight years. Many conservationists have been working to preserve the island.

Cape Romano - Florida

Values: Cape Romano is the last barrier island in Florida on the Gulf of Mexico. It provides a diverse shorebird habitat. Some nesting of loggerhead turtles has been reported on the island and manatees feed in the area. There are also many fish and shellfish in the area.

Spartina marshes and red mangrove forests on the island are extremely productive due to high rates of mixing and flushing of nutrients.

Threats: Currently there is no development on the island, but Morgan beach has been sold in small lots to about 100 individuals. Water, sewer, and garbage disposal facilities do not yet exist.

If this area were built in, the pristine quality of the entire island would be damaged. The installation of septic tanks would lead to pollution of ground water and estuarine areas. Construction of boat docks might require some dredging and filling, resulting in local water pollution and disturbance of bethnic fauna.

Outlook: The Collier County Conservancy has been spearheading the preservation efforts for Cape Romano. The State of Florida has already acquired 912 acres on Cape Romano. About 150 acres of land in the north end is being offered by the owner to the Conservancy. Collier County has zoned the island as a "Special Treatment" district and requires a permit for construction. State Coastal Setback Line Dredge and Fill Permits are required for all encompassed development.

Rookery Bay Group (Keewaydin Island) - Florida

Values: The bayside of the island is a manatee habitat. Loggerhead turtles and least terns nest on the beaches on the south end of the island. Wading birds and shorebirds gather on the southern part of the island and in the saltmarshes and mangroves.

Keewaydin Island is important for the protection of the Rookery Bay National Estuarine Sanctuary. It is included in the USFWS's Unique Ecosystems Concept Plan for Florida (1979) and the Estuarine Sanctuaries Acquisition Program List of the OCZM.

Threats: 460 acres of land in the northern portion of the island are zoned as "planned development" under a comprehensive plan prepared by the city of Naples.

Approximately one mile of Keewaydin Island has been subdivided into 200 parcels for single-family homes. Eight hurricane-vulnerable homes with on-lot septic systems and private boat docks already exist. The construction of more dwellings will destroy the undisturbed character of the island.

An inlet stabilization project at the northern end of the island has caused the severe erosion of a 1000 foot section of shoreline. Collier County and the Corps of Engineers have proposed another inlet dredging project in the southern part of the island which would threaten a highly sensitive shorebird habitat and the Estuarine Sanctuary.

Outlook: Keewaydin Island is all privately owned. The Norris family owns two-thirds of the island and wants to keep it relatively undeveloped; but family members cannot agree on the extent of development that should be allowed.

Bocilla Island - Florida

Values: The north end of Bocilla Island is a major rookery for pelicans, terns, and herons. Bobcats, American alligators and sea turtles may also be found on the island.

Bocilla Island is an integral component of the Charlotte Harbor estuary which is important for the local fish and shellfish industry.

Threats: Plans for a condominium development with a density of 20 units per acre on a 160 acre site on the north end of the island have been drawn up. In addition, county zoning permits a density of 6 units per acre over the entire island. Lehigh Acres Corporation and Mariners Properties, Inc. are currently negotiating purchases of all undeveloped acreage for development.

The island may not be available for preservation in a few years because of the efforts of these two companies to develop it.

Outlook: Bocilla Island is entirely privately owned.

Dauphin Island - Alabama

Values: Dauphin Island boasts the only coastal colony of common terns in Mississippi, Alabama, and Louisiana. It also supports brown pelican, bald eagle, and peregrine falcon colonies; oyster beds; and alligators. The area has a moderate to high concentration of nesting least terns, black skimmers and gull billed terns.

Indian Mound Park is listed on the National Historic Register.

Threats: There is extensive development on the eastern part of the island, which may spread to the Class III area on the western part.

Outlook: The developed portion of Dauphin Island suffered severe damage from hurricane Frederick. Part of the damage was the destruction of the bridge connecting the island to the mainland. The bridge collapse has limited the access to Dauphin Island and is serving to delay development.

There is controversy over whether the bridge should be rebuilt at a cost of $32 million.

Deer Island - Mississippi

Values: Deer Island supports populations of alligator, brown pelican, osprey, snowy plover, American oyster catcher, and Gulf saltmarsh snake. It has been designated as a Unique Ecosystem by the USFWS because of its habitat for the American alligator and brown pelican colonies.

The island is the site of important saltmarsh and estuarine habitat as well as nursery grounds for shrimp and crab.

There is a historic lighthouse and an Indian mound on Deer Island.

Threats: The principle threat stems from progressive private development and intensive public use of the island as a recreation area, with access potentially provided by a sky-lift.

There is extensive rip-rap at the western tip to provide protection for Biloxi Harbor. This measure has interrupted the natural littoral drift system.

Outlook: Deer Island is being considered for acquisition under Mississippi's

State Natural Heritage Program. Currently the county owns 11 acres of land on the island and the remaining 520 acres is privately owned.

Round Island - Mississippi

Values: Round Island is a natural undisturbed ecosystem with sand beaches, marshes, and extensive slash pine forests. The island is an important osprey nesting area, supporting four nests in June, 1974.

Threats: The island (75 acres of land) is owned by Jackson County. The county plans to develop it for public recreation.

Round Island is in potential danger from pollution created by the nearby port of Pascagoula.

Outlook: The Mississippi Natural Lands Heritage Program is interested in the preservation of Round Island.

Timbalier Island - Louisiana

Values: Timbalier Island is an important waterfowl and marshbird wintering habitat. It contains excellent shorebird nesting habitat and supports low concentration of nesting least terns. The island has received the USFWS's Unique Ecosystems designation because of its value in providing habitats for least terns and laughing gull colonies.

There are black mangrove communities on the lagoon side of the island. The bays behind the island support extensive submerged marine grasses.

Threats: There are eight season residences, three oil storage tanks, three oil storage tanks, three oil company headquarters and two production areas located on the island. A large oil and gas pipeline area passes ½-1 mile from the entire north shore with numerous drilling platforms. Oil spills from shipping and oil leakages from wells and pipelines present significant threats to the island's habitat.

Outlook: There is considerable concern in Terrebonne Parish over the erosion problems on Timbalier Island. The parish has obtained CZM funding of studies to investigate these problems.

Isles Dernieres (Trinity Island) - Louisiana

Values: Isles Dernieres has been proposed as a State Preservation Area by the State Parks Department and has been reviewed as a natural area of significant national resource value by the NPS in a recent study of coastal Louisiana. This island has also received the USFWS's Unique Ecosystems designation because of its value in providing habitat for brown pelican, least tern and gull colonies.

The island provides important shorebird and marshbird wintering habitat. It supports low concentrations of nesting black crowned night heron, forster's tern and snowy egrets; and moderate concentrations of nesting great egrets and Louisiana heron.

There are black mangrove communities on the sheltered side of the island. The surrounding waters are rich oyster and shrimp production areas.

Threats: There are 25 seasonal houses on the island. Crude oil and natural gas pipelines cross it. Drilling platforms and a production area are located ½-1½ miles northeast of the island and there is one well on the island itself.

Oil spills from shipping and oil leakage from wells and pipelines are potential problems. Leaching of pollutants from septic tanks is also a possible danger.

Outlook: There is considerable concern in Terrebonne Parish over the erosion problems on Isles Dernieres. The parish has obtained CZM funding of studies to investigate these problems.

The island is all privately owned.

TESTIMONY OF NATHAN V. BODDIE

MANAGER AND CO-OWNER OF CAT ISLAND, MISSISSIPPI FOR THE COMMITTEE ON ENERGY AND NATURAL RESOURCES ON S. 2686 A BILL TO DIRECT THE SECRETARY OF INTERIOR TO PROVIDE FOR THE PROTECTION OF THE BARRIER ISLANDS

MR. CHAIRMAN, like the sponsors of the Bill before this Committee, I support protection of barrier islands and changes in the National Flood Insurance Program, though I recommend some changes in this Bill. I am co-owner of a major barrier island with both barrier island and protected island features, with areas that are worthy of preservation and areas that will stand major development. I have spent my lifetime working for it and protecting it.

CAT ISLAND was included in the original proposal for the Gulf Islands National Seashore with proposed facilities of a Visitor Contact Station, Marina, Lodging Concession, Airstrip, Picnicing, Swimming and Camping Areas, Natural History and History Interpretation and Perpetuation, Concession Jitney Trips on the Island, and Bicycling and Horseback Trails. In the establishment of the Seashore (GINS), 1971, Congress removed Cat from the boundaries. In 1975, at Congressman Lott's request, we took a team from the Interior Department over the Island again and their 1976 CAT ISLAND REPORT quotes earlier studies stating"because of its elevation, only Cat Island is suitable as a location for the primary visitor contact station," and also "the stem of the Island does lend itself to construction of major public-use facilities insofar as elevations are concerned. From an engineering standpoint, the elevations permit the Island to be extensively (or intensively) manipulated for the construction of public-use facilities."

We offered to cooperate with the team in the identification of the areas worthy of preservation and to insure their preservation by selling them to the Seashore or other Conservation groups. After considering that they already had three of the four major barrier islands in Mississippi, and The Chandeleur chain in Louisiana adjacent to them, their report referred to the initial inclusion and subsequent exclusion by Congress and they concurred stating: "The August 10, 1970 report (No. 91-1397) of the House Committee on Interior and Insular Affairs...spoke directly to the question: 'Cat Island...was excluded by the committee because it was felt that its acquisition would be too costly and the relative benefits too few to warrant its acquisition.'" The Chief Ecologist of The Nature Conservancy remarked while riding down the center of the island that anyone who would classify that area as "fragile" was uninformed.

CAT ISLAND is a barrier island containing areas that with proper planning will stand major development. We have not asked, nor do we now ask, that any tax money other than our own be spent developing private facilities on our island. We believe with all the requirements for any permit today, Section 3(b) is not necessary and should be eliminated as far as permits, licenses and approval are concerned. I do not want to get off on approvals for permits but I can assure the Committee they are adequate to protect anything that needs protecting in the State of Mississippi.

While the statutory prohibition of permits contains exceptions including energy, it could prove counter-productive as far as strategic and necessary minerals are concerned. A study by the Bureau of Mines concluded that West Ship Island contained deposits of an estimated 11 million dry short tons of titanium. Portions of Cat Island have been identified by the Bureau of Mines as having similar types of Heavy Minerals including Rutile, Ilmenite and Monazite. We do not know the extent of the deposit but NOAA recently made a grant through the Sea Grant Consortium to the Gulf Coast Research Laboratory to investigate minerals in the Mississippi Sound and explore possible environmentally satisfactory methods of producing them. We have requested they investigate the water bottoms surrounding Cat Island so the extent of the deposit may be known. We have offered to cooperate with the program and with the Mississippi Mineral Resource Study being made through the Universities. This Bill could interfere with the production of strategically necessary minerals as written.

The right of access of an owner is a basic and fundamental property right, as long as he does not violate someone else's rights. To try to deny access to an owner goes against everything I have believed America stands for.

The National Flood Insurance Program needs some adjustments. In 1969 the Eye of Camille, a Force V or most violent hurricane with 220 MPH winds passed at the west end of Cat Island and the North-East quadrant of maximum intensity crossed the island before devastating the Mississippi Gulf Coast. The offshore islands had about 30% lower water levels than the corresponding shoreline as they have in other hurricanes. After the storm, an ad hoc committee of architects met on the Coast to adopt a new building code. After much discussion, the planner for the Gulf Regional Planning Commission told them Cat Island had been deed restricted to a 15 foot floor level prior to Camille and that a recently constructed home, though damaged, was still there, still square and still in line. They decided elevation was the answer and initially set a 15 foot minimum floor level for new construction. They got the point of elevation but missed two other important points --- I had also required the tying of the roof and the house to the pilings and the pilings to penetrate the ground as far as they extended. Minimum elevation is only part of it. Quality construction is required.

I attended a Flood Hazard Management and Natural Resource Protection Workshop for the South-East region recently and Mayor Jones of Gulf Shares, Alabama told of one builder who had built eight houses and seven of them went through Hurricane Frederic, with the eighth being knocked down by another house. He stressed quality of construction. As I understand it, the National Flood Insurance Program has mainly elevation minimums with standard construction practices permitted above that elevation. In order to minimize damage and reduce tax dollar subsidy, all new construction nationally insured in the exposed V or velocity zone should meet a hurricane building code as well as elevation requirements.

I understand and support FEMA's use of local engineering studies to set elevations for flood plains including hurricanes. I do not agree with the conclusions they have reached in their Hurricane Probability charts of the East and Gulf Coasts which when projected over 1,000 years show zone 12 as having 130 hurricanes and zone 15 as having 140 hurricanes. yet that 40 of zone 12 would be "great" hurricanes and none of the 140 in zone 15 would be above 125 MPH. There is no way for Cat Island to get 40 "great" hurricanes out of 130 and Santa Rosa Island to get no "great" hurricanes out of 140 when all it takes is a small variation in the guiding pressures. These zones are only 100 miles apart on the Northern Gulf Crescent. These same types of projections insure some buildings on eight foot elevation in exposed locations while requiring others to build 13 in reasonably protected areas. The pattern has been to go into an area after a hurricane has hit and raise elevations. Damage could be minimized nationally from hurricanes over the long haul with a review of projections and corresponding adjustment of minimum building requirements.

I recommend:

1. Cat Island, Mississippi be eliminated from the boundaries encumbered by S.2686;
2. Sec. 3(b) be modified to eliminate the restrictions on permits, licenses, or approval of any Federal agency;
3. Flood Insurance requirements be strengthened nationally and that rates be based on an actuarial basis considering location, elevation and quality of construction.

Everyone without exception, governmental agencies, conservationists and developers, has wanted to take all of Cat Island. I believe it is as wrong to try to preserve all of it as it would be to try to develop all of it. I am working to put the right things in the right places and at the right time, the highest and best use of each individual area. We are working with planning agencies, the academic community and the regulatory bodies to accomplish this objective.

O